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VALUABLE PRESENTATION TO THE LIBRARY AND MAP DEPARTMENT.

The Society has received a most valuable gift from one of its oldest members, Dr. A. Peckover, of Wisbech, Lord-Lieutenant of Cambridgeshire, who, among his varied interests in the field of scientific and antiquarian knowledge, has long given a foremost place to the study of the history of cartography, having in course of time brought together one of the most important collections of early maps and atlases to be found in this country in private hands. Wishing that these treasures, many of them now almost unattainable by the collector, should benefit as wide a circle as possible, especially among the Fellows of the Society with which he has been so long associated (he joined it in 1853), Dr. Peckover made to the Council the munificent offer to present to its collections of books and maps such of these works as might not already be in the Society's possession. An equally generous offer is not made every day, and, needless to say, it was accepted by the Council under a due sense of the value of the gift. Although the Society's collections of early geographical documents have been much improved from time to time—notably, of late years, by the liberality of another donor, Mr. Henry Yates Thompson, there were still not a few *lacunæ*, in the case of special rarities, a number of which it has now been possible to fill up. The number of works presented amounts to about forty, and an important step has thus been made towards the ultimate completion of a thoroughly representative collection of the monuments of geographical history, which, as the leading representative of the subject in this country, the Society may fitly aspire to possess.

The new acquisitions are all of distinct value, but a few may be

singled out as especially worthy of mention. First of all comes a copy of the Italian collection of maps generally known as 'Lafreri's Atlas,' from the fact that many of the maps, and probably also the title-page, were engraved at Rome by Antonio Lafreri. The importance of this early atlas for the history of sixteenth-century cartography was pointed out by Nordenskiöld in his 'Facsimile Atlas,' for the title-page of which a facsimile of that designed for Lafreri's collection was employed.* The maps, which are the finest specimens of early Italian cartography and engraving that have come down to us, were of varying dates and the work of many different draughtsmen, their collection into one set, with general title-page, being the earliest instance of the publication of an "Atlas" in the modern sense of the term, if we except the numerous editions of Ptolemy accompanied by modern maps which appeared during the course of the same century. The comparatively few copies of the Atlas which are known to exist all differ in their contents, which is not surprising, having regard to the way in which the maps were brought together. A list was given by Nordenskiöld of all the maps and plans (142 in all) to be found in his own copy or in the three volumes contained in the library of the "Collegio Romano." The greater number of these occur also in Dr. Peckover's copy, in which the number of plates is 101; a few of the maps, however, and a greater number of the plans and representations of battles and sieges, being not found in Nordenskiöld's list.

Among the more interesting or important of the maps in the Society's new acquisition are: Florianus' map of the north and south hemispheres in radially arranged gores; the map of the British isles (dated 1562 in the present copy, but sometimes found with an earlier date), giving the first tolerably accurate delineation in print of the contours of the coasts, especially those of Scotland; the copy of Olaus Magnus' famous map of the northern regions; the three sectional maps of Asia, by Gastaldi, some account of which was given by Nordenskiöld in the *Journal* for April, 1899 (vol. 13, p. 396); besides many maps of European countries, generally much in advance of any previously published; the earliest in date being Gastaldi's map of Sicily of 1545.

Next, or possibly before this in importance, is a fine copy of Berlinghieri's metrical version of Ptolemy's geography, which is noteworthy as containing not only one of the very earliest sets of engraved maps ever issued, but actually the first printed modern maps. In this respect it possesses an even higher interest than the famous Rome edition of 1478, which included only the twenty-seven Ptolemaic maps. The date is not known with certainty, but from its dedication to Frederick, Duke of Urbino, who died in 1482, it is certainly not later

* This title-page gives the earliest representation of Atlas bearing the globe as symbolical of a comprehensive guide to geography.

than this year, while some have even held that it is earlier than the Rome edition. The modern maps are those of Spain, France, Italy, and the Holy Land, and already show considerable progress towards a correct delineation of the outlines of these countries. Of later editions of Ptolemy, Dr. Peckover has presented copies of the Strassburg edition of 1520 (the second issue with Waldseemüller's maps); the Venice edition of 1561 (the first Italian translation, by Ruscelli, from the original Greek, with maps based on Gastaldi's); the Cologne edition of 1606 (third of Magini in Latin); and the fine Elzevir edition of 1618, by Bertius, with Mercator's maps, the Peutinger table, etc. With these additions the Society's collection of Ptolemies now includes one or more copies of every important type, with the sole exception of the rare Bologna edition dated 1462 (probably a mistake for 1472 or 1482).

Other works included in Dr. Peckover's gift are the 'Isolario' of Bartolommeo Zamberto, of about 1479—a scarce collection of sonnets, illustrated by woodcut outline-maps of many of the islands of the Ægean, etc.; the 1547 edition of Bordone's 'Isolario;' the first edition (1576) of Porcacchi's 'Isole piu famose del Mondo;' the first (Latin) edition of Wytfliet's 'Descriptionis Ptolemaicæ Augmentum' (1597), giving a series of maps of the newly discovered regions; Quadus' 'Fasciculus Geographicus' (1608), a small atlas of maps, with letter-press, after the Ortelius-Mercator type; Morisot's 'Orbis maritimus' (1643); as well as a number of modern works bearing on the history of geography, which have hitherto been missing from the Society's collection.

LIBERIA.*

By Sir HARRY JOHNSTON, G.C.M.G., K.C.B.

LIBERIA is a portion of the West African coast-lands which may be styled the end of Northern Guinea. Its southernmost promontory—Cape Palmas—of all the Guinea Coast, projects furthest southwards, to scarcely more than 4° from the equator. The northern political boundary of Liberia meets the coast at the mouth of the river Mano in N. lat. 7°. The actual boundary on the south, between Liberia and the French possessions on the Ivory Coast, is the course of the river Kavalli, the mouth of which river lies about 13 miles to the east of Cape Palmas, in lat. 4° 22′. The northernmost extremity of Liberian territory on the coast lies just to the south of that marshy and densely forested portion of the Sierra Leone colony—the Sherbro district—which one might say, with a fairly accurate guess, was the furthest point reached by the Carthaginian explorer Hanno in his celebrated

* Read at the Royal Geographical Society, March 27, 1905. Map, p. 248.

voyage of discovery along the north-west coast of Africa in about 520 B.C. It is probable that the "gorillas" which Hanno's expedition captured somewhere in the vicinity of the Sherbro river or of northern Liberia were the chimpanzees still found in these regions.

It will be seen on the map that Liberia occupies a most important strategic position on the West Coast of Africa. The general trend of its coast is from north-west to south-east, parallel to the course taken by steamers plying across the Atlantic between Europe and South Africa. It might, in fact, in the hands of a strong naval power, exercise a very dominating influence over the eastern Atlantic, which is one reason, amongst many others, why Great Britain desires to see the independence of the Liberian republic preserved and maintained.

The country of Liberia, as a whole, is one dense forest. It is practically the culmination of the West African forest, the regions to the north, east, and west having been more extensively cleared by man in past times, or partaking more of the park-land, grass-grown character owing to their less copious rainfall. Now that two English companies, in conjunction with the Government of Liberia, are endeavouring to develop the resources of the interior, and to accumulate knowledge regarding the climate and products, attempts are being made to record the rainfall, as to the extent of which at present only a guess can be made. It is probable that south of lat. 8° 30′ the average annual rainfall of Liberia is not less than 100 inches. Adjoining regions in Sierra Leone have a recorded rainfall of something like 130 inches, so that this is probably an under rather than an over estimate. North of lat. 8° 30′ the rainfall diminishes probably to 60 or 80 inches per annum, and in consequence the dense forest gives way to a pastoral country of savannas, grassy hills, or park-lands of grass, with dense forest along the stream valleys. Mr. Alexander Whyte, well known by his many years' work as an official in charge of botanical departments in the British East African Protectorates, spent a good deal of 1904 in Liberia, and in the report which he drew up for my information he considers that this country—which has a seaboard of approximately 350 miles long (from north-west to south-east), and a total superficies of about 45,000 square miles—has two somewhat different climates, depending, no doubt, a good deal on the latitude. In the southern regions below lat. 6°, the rainiest time of the year appears to be the months of March to June, and August to December. North of this—round Monrovia, for example—the specially rainy months are April to the end of July, September and October.

From my own experience of Liberia, I should say that the heavy rainy season begins in April and lasts till the end of July. Then there is a pause of a month or six weeks with less rain, the heavy rains beginning again in September and lasting till the middle of November. From mid-November till the end of March is the dry season, at any

rate in the northern half of Liberia. But in the southern part this dry season is not much more marked than it is in the Niger Delta. Rain, in fact, may fall in any month of the year. Between November and April is the worst season for storms, some of which are very violent.

When I first visited the coast of Liberia, in 1882 and 1885, the primeval forest grew down to the sea along a great proportion of the coast; but when I revisited this country in the summer of 1904, and touched at a good many places at the coast where I had noted forest

A MANDINGO.

growing as late as 1888, much of this big-tree woodland had been swept away to make room for plantations or even for towns. In fact, with a few exceptions, the big-tree and rubber-producing forest does not usually begin in its most marked characteristics until a journey of at least 15 miles has been made inland from the coast. I have estimated, from the reports of the agents of the British companies, and from the accounts of Liberian, British, and French explorers, that out of the 45,000 square miles which may be approximately assigned as the area of the

Liberian Republic, at least 25,000 square miles consist of dense, uncleared forest, penetrated, it may be, by narrow native paths, but as often as not only pierced by elephant-made tracks. About 3500 square miles represent the plantations, gardens, towns, and settlements of the Americo-Liberians along the coast, and 2000 or 3000 square miles the clearings made by the indigenous natives in the dense forest. The remainder of the territory—about 15,000 square miles—is grass or park-land in the possession of the Mandingo tribes, who are great cattle-breeders. This is the characteristic of the far interior of Liberia, where it borders on the French possessions of Upper Nigeria. From all accounts I can collect, as well as from the little I have seen myself, I do not think that much of the interior of Liberia can be described as marshy. It is, on the other hand, inclined to be hilly, and at distances of from 40 to 100 miles inland the ranges of hills reach altitudes which might almost be dignified by the name of mountains. Some of these mountains (the Nimba range) attain heights of over 6000 feet—this, at any rate, is the height ascribed to them by certain French explorers; and from what I am told by Mr. Maitland Pye-Smith, one of the agents of the aforesaid British companies, I am inclined to think that 4000 feet, at any rate, is reached or exceeded by peaks in the Satro range. If the reports of certain travellers are justified, however, it may well turn out that there are altitudes (such as Mount Druple) on the Franco-Liberian border of over 9000 feet, and consequently higher than anything that is to be met in West Africa south of the upper Niger and west of the Cameroons. Some of these mountain-sides are precipitous, with faces of bare rock. Others, again, are clothed with dense vegetation to their summits, and this continuance of dense and lofty forests for miles and miles and miles will be a terrible hindrance to surveying in the future, whilst at the present time it gives to Liberian exploration the same sad and somewhat dreary character that has been so powerfully described by Stanley in recording his adventures in the great Congo forest. Much as the botanist may glory in the splendid vegetation, I really think that in the long run one wearies more quickly and easily of forest than of desert.

Forest, in fact, is the distinguishing feature of Liberia as a country; it is the climax of the forest region of West Africa. In and from the forest will be derived the great future wealth of this country. The geologic formation would appear to be mainly Archæan, and the rocks are mostly granite and quartz, with here and there indications of volcanic tuff. The rocks near the sea-coast and in the coast ranges of hills are much impregnated with iron, and are consequently very red in colour. The appearance of this rock, especially where it is revealed by the roads which the Americo-Liberians have cleared in the coast region, is curiously pitted and honeycombed. It is hard, becoming especially indurated on exposure, and this makes it a good surface for

road-making, as it does not degenerate into mud. Very little is known about the possible mineral wealth of Liberia up to the present time, as the extremely dense forest of the interior is a great obstacle to a rapid survey of the country. Apart from hæmatite iron, which appears to exist nearly everywhere, there are traces of gold in the mud of the rivers, and native stories assert the existence of alluvial gold in the Mandingo uplands beyond the forest region. Lead has been discovered recently in the Kelipo country in eastern Liberia, and zinc ore in the

BORASSUS PALM AND OIL PALMS.

vicinity of Monrovia. In the Kavalli region there is a great deal of corundum in the rocks. It has been alleged that a diamond was discovered in the hills behind Grand Basá by a Liberian, but as yet no confirmation of this discovery has reached me; nor have I been able to ascertain where the copper comes from which is used to a limited extent in some of the Mandingo weapons from the far interior.

The Liberian forests contain most of the West African timber trees. Such ebony as is exported, however, does not seem to be so good as that

which is derived from the genus *Diospyros*. It is very probably derived from a papilionaceous tree belonging to the botanical genus of *Dalbergia*.* The wealth of this forest in indiarubber-producing trees, vines, and bushes is without parallel in any other part of Africa, unless it be one or two small areas of the Congo basin. Counting the four rubber-producing figs, there appear to be at least twenty-two trees, plants, or vines which produce saleable rubber. These species include the well-known and widespread *Landolphia owariensis* and the magnificent *Funtumia elastica*, the rubber tree once so abundant in Lagos colony. The *Funtumia elastica* is stated to grow to over 200 feet in height. It closely resembles in appearance the allied species *Funtumia africana*, but there is a very considerable difference in the price of the rubber yielded by the one and the other—the rubber derived from *Funtumia africana* may, perhaps, be sold for eighteenpence a pound, but the well-prepared rubber of *Funtumia elastica* ranges in value from three to four shillings. The distinctive features of the leaves, flowers, and fruit, which enable the observer to decide whether he is tapping the valuable or the valueless *Funtumia*, will shortly be illustrated in my book on Liberia. The range of the *Funtumia elastica* appears to extend from the middle of Liberia eastwards as far as western Uganda. It is found in a portion of the Bahr-al-Ghazal region and in the northern part of the Congo Free State. The *Funtumia africana* is more strictly West African in its range, from Portuguese Guinea to the Congo basin. In the western regions of the Congo Free State and in Angola a third *Funtumia* is found, which, like *Funtumia africana*, is of not much value to the rubber trade. Mr. Alexander Whyte, in his systematic examination of the Liberian flora, which he undertook at my request during 1904, has discovered two new species of wild coffee—*Coffea nudiflora* and *Coffea ligustrifolia*. The well-known Liberian coffee with a big berry is, of course, indigenous to the country, and is now being exclusively cultivated by the Americo-Liberians on the coast.

In Liberia, of course, as in most densely forested countries, the displays in colour masses of large aggregations of flowers are not so often observed as in the park-lands and more open country. Still, there are many objects of beauty in the forest which should be enumerated as prominent features in Liberian scenery. Every pool and creek of still water is covered with water-lilies, chiefly the common *Nymphæa lotus*, a small variety of which is also present, and is peculiar to Liberia. In the damp glades there are abundance of *Crinum* and *Hæmanthus* lilies. A small and very beautiful terrestrial orchis grows on the surface of the water in shallow pools. In the dense forest there are numerous epiphytic orchids, chiefly *Angræcums*, with enormously long

* There are two species of ebony-producing Dalbergia in Liberia, one of which has just been discovered by an agent of the Monrovian Rubber Company—*Dalbergia liberica*.

nectaries. A species of vanilla grows wild in the bush. There are many zingiberaceous plants in the undergrowth of the forest, sometimes with large and delicately coloured flowers, at others remarkable for the size and rich colouring of their leaves. Amongst these may be noted *Costus*, *Amomum*, *Thalia*, and *Renealmia*. Another family of plants well-represented in the undergrowth, and remarkable for the variety and beauty of their foliage, are the arums. Prominent amongst these are

A VILLAGE IN THE SUPO COUNTRY.

Anchomanes, *Culcasia*, *Nephthytis*, *Aglaonema*, and *Cytosperma*. The *Lonchocarpus* tree has at times magnificent displays of lilac blossom, not unlike wistaria in shape and colour. The waxy-white camelia-like flowers of the *Anona* are objects of great beauty, especially where they are thickly clustered along the horizontal branches. The *Mussændas* also light up the forest with their red or white bracts. One *Mussænda*, or a closely allied plant, has gorgeous scarlet-crimson bracts like a *Poinsettia;* another, which is very common, not only in Liberia, but throughout the whole forest region of West Africa from Portuguese

Guinea to Uganda, has a cluster of large white bracts below the yellow flowers. These bracts, which are leaf-like in shape (though not like the leaves of the plant itself), look at a distance like foliage cut out of white velvet. The *Ochna multiflora* is a beautiful flowering tree.

Beyond the forest region a park-like country is entered, inhabited for the most part nowadays by a more or less Muhammadanized people, belonging chiefly to the Mandingo stock. These Mandingos keep large herds of cattle, examples of which find their way down to the coast through the forest roads. They are similar to the breed which is on sale at the market of Sierra Leone—smallish, straight-backed cattle (without a hump), one-coloured as a rule (fawn or grey or reddish-yellow), with rather long horns. This breed resembles in miniature the long-horned Gala ox which is found in southern Abyssinia, and thence, with several breaks in its distribution, to Uganda and the west side of Tanganyika, and across the Nile to the shores of Lake Chad. The Mandingo ox is, to my thinking, simply a dwarfed variety of this Gala breed, which seems to have been the oldest form of domestic ox known in Africa. In origin it is thought to be more connected with the Indian cattle than with the descendants of *Bos taurus;* but when it is found in its purest form, it has not got the hump that is associated with the zebu species, though it freely mixes with that type, and sometimes thus acquires the zebu hump in addition to the characteristics of the extremely long spreading horns (longest in the cow) and the tendency to be one-coloured. I am not so sure myself that this type of ox is necessarily descended from *Bos indicus.* It is represented in the paintings of the Egyptian monuments together with the zebu type. It may have been descended from an intermediate type of wild ox native to North-East Africa—intermediate between *Bos taurus* and *Bos indicus.*

In this open Mandingo country of hills, mountains, and grass-lands there is said to be a great deal of big game. The lion exists there, hartebeests of the West African type, water-buck, giraffe, roan antelope, reed-buck, possibly zebra, rhinoceros, and giraffe. Elephants are abundant all over Liberia down to within about 30 miles of the coast region. In fact, many of the paths through the forest are little else than elephant tracks. Elephants are a good deal dreaded by the natives of the forest region, as they are alleged to attack man quite unprovoked. They do a great deal of damage to plantations. The Mandingos, by-the-by, have horses similar in appearance to the native breeds of Nigeria. Occasionally one of these horses finds its way down to the coast in Liberia; but, as a rule, the few horses one meets with at Liberian coast towns have been brought by sea from French Guinea (Konakri). It is an important fact, however, of great negative value, that apparently there is no Nagana or tsetse fly disease in Liberia. No doubt there are one or more species of *Glossina* related

to the tsetse fly, but they do not carry the celebrated tsetse disease to horses and cattle.

The principal and remarkable animals of the Liberian forest region are, amongst antelopes, the handsomest of the Tragelaphs, the bongo. This splendid animal, good specimens of which are to be seen in the Natural History Museum at South Kensington, is almost the largest in size of the Tragelaphs, being exceeded only by the eland. It is magnificently coloured bright chestnut-red, with a few points of black, and bold

A CANNIBAL FROM THE INTERIOR.

white stripes and bars. It seems to be fairly common in the Liberian forests, which also conceal in their recesses curious developments of the Cephalophine antelopes, or duykers. These duykers, in other parts of Africa, are usually associated with the idea of a very small antelope. But in Liberia there is the wide-spread *Cephalophus sylvicultrix*, which is nearly the size of a small cow, and *Cephalophus jentincki*, which is about the size of a fallow deer, with short stout horns. Besides several small types of duyker, there is the tiniest of all the antelopes—the royal

antelope—not so large as a hare; and there is the beautiful zebra antelope, which is bright yellow-bay boldly marked with bold black stripes, a most unusual coloration in this group. The buffalo of the forest region is the red-haired, dwarf short-horned buffalo. The ordinary big hippopotamus is said to be present in the lower Kavalli river; but Liberian streams and forests are for the most part frequented by the pygmy hippopotamus, an animal which probably extends its range from the interior of Sierra Leone to the French Ivory Coast. Before I leave the question of the fauna, I should like to mention that, in addition to there being apparently no Glossina fly to spread the tsetse disease, there is a great relief in other directions from the ordinary insect pests of Africa. Mosquitoes are very seldom met with. In fact, they seem to be entirely absent from much of the forest region. Nor are white ants very common or destructive in the centres of population.

The human population of Liberia consists of the following elements, which may be divided, first of all, into indigenes and Americo-Liberians. The former number something like two millions, and the latter between twelve and fifteen thousand. So far as the outside world is concerned, the world of treaties and congresses, the country which we know as Liberia is considered to belong to and be governed by this small caste of English-speaking negroes and half-breeds of American origin. These English-speaking negroes certainly govern and administer the coast-line and a belt of more or less settled country which extends from 20 to 40 miles inland. Of late years they have been on generally friendly terms with the two million indigenous negroes, some of whom have come very much under their influence.

The Americo-Liberians are the survivors or the descendants of freed slaves or persons dissatisfied with their social condition in the United States of America during the early part of the nineteenth century. A considerable number of them also came from the British West Indies; but the movement which founded Liberia—the black republic on the West Coast of Africa—originated with certain philanthropic societies in the United States about 1821. The idea, however, in its genesis was the outcome of that still earlier movement in Great Britain which led to the formation of Sierra Leone. When British philanthropy in the eighteenth century was awakened to the injustice of the slave trade and the unhappy condition of many of the runaway slaves or freed negroes in the West Indies or in British America, it was decided to repatriate a number of these people, and for that purpose (possibly also with an eye to the main chance in securing for Great Britain one of the few good natural harbours on the West Coast of Africa—Sierra Leone) a settlement was formed on the site of the modern Free Town, without overmuch regard to the feelings or rights of the local inhabitants. In the same way, when it was decided in the United States to found a home for the repatriated African, the prior experiment of Sierra Leone

turned attention towards the same coast, and in 1821 and at subsequent dates settlements were effected, firstly at Monrovia, and later on at Roberts Port, Grand Basá, Sinó, and Harper (Cape Palmas). Usually those who conducted the enterprise went through the form of buying small plots of land from local headmen or chiefs; but, as a rule, the promoters of this movement did not trouble overmuch about the rights of the "bush niggers," as the indigenous natives were termed. Consequently, the first fifty years of the history of Liberia were marked by constant struggles between the Americo-Liberian invaders and the native blacks. During the last ten years, however, there has been a marked advance in

THE KAVALLI RIVER.

good relations between the American settlers and their native subjects, as many of them may fairly be called. The wise policy of President Barclay has greatly promoted this good feeling since 1904. He has been able to assemble at different times at the capital chiefs or their representatives from almost all parts of Liberia, even from the Mandingo districts just beyond the limits of the coast-belt. Therefore they have no subject of disagreement. Curiously enough, one example of this mild rule of black by black is that the white man in Liberia is everywhere received with great friendliness, because he is not associated in the minds of the natives with anything like conquest or oppression.

How far the original experiment will succeed, the next twenty years will perhaps indicate. The negroes of American origin who have

settled in Liberia have not, as a general rule, been able to stand the climate very much better than Europeans, and as a rule they have not been able to rear large families of children. Yet it seems to me as though Liberians of the new generation born in the country are beginning to take hold; but this is partly due to the increasing—and I think very sensible—practice of intermarriage with women of the fine vigorous indigenous races. Probably the future of Liberia will be a negro state very like Sierra Leone in its development, with English as its Government language, and such English or American institutions as may prove to be suited to an African country, a coast-belt inhabited by negroes professing Christianity and wearing clothes of European cut, and a hinterland of Muhammadans dressed in the picturesque and wholly suitable costume worn at the present day by the Mandingos and by most Muhammadan negroes between Senegal and the White Nile.

The native races of Liberia, the languages they speak, and the religions they profess may, to a certain extent, be grouped under two classes, the Mandingo on the one hand, and the Kru negro on the other. I am aware, of course, that the Mandingo type is a very variable one physically, according to the less or greater degree of Caucasian blood which permeates its negro stock, and also that the Kru man proper is confined in his distribution to a small portion of the southern coast of Liberia. But each of these types is sufficiently representative to serve as a general illustration of the two classes of Liberian peoples. Associated with the Mandingos to a great extent, in language, in Muhammadan religion, and in the adoption of the Arab dress, are the Vai and the Gora of western Liberia, and to some extent the Buzi, or Kimbuza. All the remaining tribes are more or less related to the Kru stock in language, appearance, physique, customs, and the profession of a pagan and fetishistic religion, similar in general features to the fetish religions of all Western and West Central Africa, with some points of resemblance to the Bantu beliefs in the southern half of Africa. The Gora language of western Liberia is rather a puzzle in classification, and it must be admitted that it only offers the slightest affinity to the Mandingo group, and an equally slender connection with the Kru family. In a still more generalized way, it may be said that there are distant resemblances between the languages of the Kru and Mandingo stocks; nor can these slight resemblances be altogether explained by the mere imposition of linguistic influences. The Mandingos, who are destined to play a most important part in the development of Liberia and of much of West Africa, are nothing but a varying degree of cross between the Fula race of the West African park-lands and the ordinary West African negro. This crossing, and the founding of this group of people —the correct pronunciation of whose name seems to be Mading'a, or Manding'a—may have been a relatively ancient one. The Mandingos,

in fact, are the Swahilis of West Africa, and offer a striking resemblance in face to the average type of Swahili porter that one meets with on the Zanzibar coast. They also often resemble natives of Uganda, and for the same reason—that a good deal of the population of Uganda is infused with a slight Hamitic element derived from the Hima aristocracy. Several Mandingos whom I met at Monrovia were able to speak Arabic in a halting fashion. The Arab words they understood best were those pronounced in the North African dialect. It seemed to me that in some cases the Caucasian element in the Mandingos was derived from direct intermixture of Berbers and Arabs from North Africa with the negroes of the upper Niger. I doubt if any pure-blooded Fula people extend their range into the northern limits of Liberia; but they have had an undoubted influence in times past over the development of the park land which lies beyond the forest. By their minglings with the indigenous negroes of the Sudanese and West African type, they have created the Mandingo peoples, and have also carried Muhammadan civilization and tenets into that part of Africa, as well as, no doubt, the Sudanese breeds of cattle and sheep. The domestic sheep of all the *forest* region of Liberia is that common to the other forested parts of West Africa—the sheep with erect ears, fairly well-developed horns, small size, black and white colouring, a tail without any fatty development, and a long throat mane in the male. Far back in the interior of Liberia, I am informed that the Mandingo sheep are similar to those of the Sudan, with fat tails and without the throat mane.

It should hardly come within the limits of the present paper to discuss one of the most interesting problems in Africa—the origin of the Fula race. Personally, I am still disposed towards the old theory that the Fulas were an early cross between the Libyans of North Africa and the negroes of Senegal, a cross in which the Caucasian element predominated considerably. They certainly offer marked resemblances, however, to the Hamitic aristocracy of the upper Nile and the lake regions. Their language is a complete puzzle. At present it cannot be said to offer affinities of a marked kind to any group of negro speech; but it is emphatically a negro tongue (with a faint suggestion here and there of the Bantu family), and not in any way influenced by Hamitic, Libyan, or Semitic characteristics. As to the Libyan affinities of Hausa there can be no doubt, but nothing of the kind has as yet been discerned in the structure or vocabulary of the Fulfulde. It even seems to offer less resemblances in structure to the Hamitic language-family (for example) than can be discerned in the Bantu.

Of all the peoples in Liberia affiliated with the Kru stock, perhaps the most numerous group is that of the Kru, which occupies the coast of Liberia between the French frontier at the Kavalli river and the river Sestos. With the Kru I associate the Grebo, as the two peoples differ but little in language, and scarcely at all in physical type. The

Grebos are inclining strongly towards Christianity, but very few, if any, converts to that religion have been made amongst the Kru people proper who inhabit the coast between Greenville and Garraway. Krus and Grebos together number something like 375,000. The next most important group of people, as regards numbers, are the Mandingos, of whom there are, perhaps, 300,000 within the limits of Liberia. After them may be ranked the Kpwesi people, a general term for a congeries of tribes speaking dialects of a common language. These Kpwesi (familiarly known by the Americo-Liberians as Pessi, or Pessa) may be as many as 250,000. In an appendix to this paper the rest of the tribes and their approximate numbers are enumerated.

In the central parts of Liberia, within the limits of the forest, there is no doubt that cannibalism prevails. This is a very marked feature in the life of the Beila, or Bele. These people are said to relish most keenly the hands and feet, and this very dainty dish is usually set before a king or chief alone. Nowhere in Liberia have I noticed—nor has any explorer encountered or reported—any race of negroes wholly naked, either among men or women, such as are so commonly met with in Eastern Equatorial Africa, or until a few years ago in parts of South Central Africa. A certain degree of complete nudity in unmarried women was at one time quite a common feature of the natives of the Niger delta, the Cross river, and the Cameroons, while on the upper Cross river complete nudity among the men was just beginning to disappear twenty years ago. Throughout Liberia no one has ever observed complete nudity amongst either men or women. Though there are a few rare exceptions to this rule, it may generally be observed that the marked feature of male nudity so characteristic of the upper Nile, the Eastern Equatorial regions, and originally of the north end of Lake Nyasa and Central Zambezia, is never met with in the forested regions of Africa, except possibly here and there amongst the Pygmies. Throughout the Congo basin and countries as completely savage as the innermost parts of Liberia, the men wear a minimum of clothing, which is a concession to ideas of decency, and which, when the race is quite out of touch with the trade of the outer world, is generally a strip of bast (bark cloth) from a fig-tree. I have not observed any of the savages from the interior of Liberia wearing dressed skins. I am told that so greedy are they after food, that when any beast is killed the hide is roasted and eaten. On the other hand, the civilized Mandingos of the north have learnt from the Fulas or from the Moors, or possibly from both, the most beautiful work in leather.

Nowhere along the coast of Liberia is there a harbour in the sense of the bay at Sierra Leone. All the anchorages, in fact, are open roadsteads. But, on the other hand, this is not a particularly dangerous condition for ships, as the south wind never blows strongly enough to raise a big sea, whilst the north wind, coming from off the land, can

only affect the Atlantic at some distance from the shore. But, of course, this portless condition adds very much to the discomfort of dealings with Liberia. Although the swell from the choppy surface raised by the wind may not be sufficiently serious to affect big vessels lying at anchor, it is not at all nice for small boats or steam-launches, and generally during the rainy season of the year transference from the big steamer to the shore-going boat has to be effected by means of a crane and a cradle. Still more to be dreaded on some points on the coast is the landing or the going off, on account of the surf. Perhaps the best approach to a sheltered harbour which exists is at the capital, Monrovia.

FOREST COMING DOWN TO SEA-SHORE.

Here there is a bar to a small river or creek which communicates with the St. Paul's river. The bar is very seldom rough, being to a certain extent sheltered by a promontory, and once across the bar you can land quite comfortably on the beach in perfectly smooth water. But at places like Grand Basá, Sinó, and Cape Palmas, the landing can be extremely dangerous and disagreeable. One seldom arrives at or departs from these places without, at any rate, a wetting from the rollers that break over the stern or bow of the boat. However, real accidents to persons or property are, it must be confessed, of rare occurrence, and the whole question depends very much on the good or ill will of the Kru boys who direct the steering.

The Kavalli river, though probably less in volume than the St.

Paul's, is the most navigable as a means of access to the interior. Unfortunately, there is a very bad bar at the mouth of the Kavalli, or it would have played a very different part in the history of West Africa. Once across the bar, a steam-launch or a rowing-boat can ascend the river for about 80 miles, when the first rapids are reached. The upper Kavalli is imperfectly known, and, indeed, its extreme upper course is still a matter of conjecture. On the definition of its course depends to a great extent the laying down of the north-eastern frontier of Liberia according to the French Treaty of 1892.

The St. Paul's river is only navigable as far as a place called White Plains, about 20 miles from the mouth. There is no difficulty about the bar at the mouth of the St. Paul's, for this reason, that one can land with little or no risk at Monrovia; and once inside the Mesurado river (which is merely a creek), one can embark on a small river steamer, of which there are two or three in existence, enter the St. Paul's river by the Stockton creek, and thence ascend the St. Paul's to the first rapids near the settlement known as White Plains. All the lower part of the St. Paul's river is pretty thick with Americo-Liberian settlements, some of them of a distinctly prosperous and prepossessing appearance. Several of the officials at Monrovia have country houses on the banks of the St. Paul's amid charming surroundings. This great virtue may be attributed to the Americo-Liberians, that they certainly know how to build houses, comely in appearance, sanitary, and lasting, or as reasonably durable as one can expect in a land of heat and moisture. In fact, the leading characteristics of the Americo-Liberians are their love of building and their remarkable politeness.

For some distance above its first rapids the St. Paul's river is scarcely navigable for canoes; but in the little-known region north of Dobli Zulu island, it is said to be navigable for canoes up to its junction with the Tuma, which is also stated to be an important stream.

Eastwards of Monrovia, the Mesurado river or creek reaches, as a navigable piece of water, to within a very short distance of the Junk creek, which is a branch of the Dukwia river; so that, except for a little isthmus of sandy soil, Monrovia might be situated at the western extremity of a long island. With developments that might come later on, it would be very easy to cut a canal to join the Mesurado and the Junk rivers. This would then give access for vessels of light draught to the Dukwia and Farmington rivers. These streams debouch at a settlement of some importance named Marshall; but the bar at Marshall (mouth of the river Junk) is extremely bad and dangerous. As a matter of fact, with a very little expenditure of money Monrovia might be made a good port.

The population of Monrovia, so far as Americo-Liberians and foreigners are concerned, is about 2500. It has a system of telephones

which connects it with the settlements on the St. Paul's river. This has been set up, and is well worked, by a native Liberian. It is, perhaps, hardly necessary to remind you that Monrovia was named after the celebrated President of the United States, Monroe, who is responsible for that doctrine which inhibits any European nation from further conquests in the New World. The capital of Liberia is divided into two parts, the low and shoreward section being given over to large settlements of Kru boys and indigenous negroes, while the upper part of the town is inhabited by Americo-Liberians and European consuls, traders, etc. This civilized part of the town is composed of broad grass-grown streets, and substantial, well-built, comely-looking houses, churches, offices, and public buildings. The smart appearance of the houses, in fact, is in somewhat striking contrast to the neglected condition of the roads. These have never been made, and are simply the unlevelled rock of more or less flat surface. Consequently, at the present time they are absolutely unsuited to any vehicle, though I have seen an enterprising Liberian negotiate them with a bicycle. They are generally covered with a very short, close turf of thickly growing plants, which is kept in the condition of turf by the constant nibbling of the pretty little cattle that frequent the streets of Monrovia. A less agreeable feature are the pigs, which exist in great numbers and perform the office of scavengers. The appearance of most of the houses is, as I have said, either very striking or comely both in form and colour, and this appearance is enhanced by the beautiful clumps of trees and the gardens which surround most of the houses. The Americo-Liberians seem to be very fond of flowers, and have gardens full of roses, oleanders, allemandas, bougainvillia, and frangipani in constant bloom. There are numerous churches and a masonic hall.

There is a good deal of civilization and comfort and signs of progress at the settlements, which are grouped together under the general name of Grand Basá, and also at the Sinó towns, the principal of which is named Greenville. But perhaps, on the whole, the most go-ahead and energetic assemblage of Americo-Liberians is to be found at Harper (Cape Palmas). Here there is a philosophical society, which is doing a good work in collecting and printing statistics about Liberia. But Harper, unfortunately for Europeans, is a good deal more unhealthy than Monrovia.

Compared with other parts of West Africa, I should say that Liberia is less unhealthy for the European than Sierra Leone, the Ivory Coast, the Gold Coast, or Lagos. But it is, perhaps, too soon to judge. It is noteworthy, however, that the remarkable absence of mosquitoes should to a great extent coincide with a less marked prevalence of malarial fevers.

From the European point of view, perhaps the most healthy part of Liberia is the northern half, and from all accounts it would be the

Mandingo plateau that Europeans would prefer for their trading or mining settlements.

The great undoubted wealth of Liberia lies, as I have already pointed out, in its rubber, but the trade in this product is as yet only in its infancy. Another important article of export in the future will be timber. Piasava, which is a fibre derived from the rind of the fronds of a Raphia palm, figures to some extent in the exports, which also include coffee, a little cacao, ivory, copal, palm oil, palm kernels, ginger, cam-wood, and anatto.

APPENDIX I.

Peoples and Tribes of Liberia.

The following is a summary of the principal Americo-Liberia towns and settlements with their approximate populations. The enumeration commences with Roberts Port, not far from the western (Sierra Leone) frontier of Liberia, and proceeds northwards, southwards, and eastwards to the French frontier along the Kavalli river:—

	Americo-Liberian population.	
County of Montserrado:—		
Roberts Port		400
Royesville		50
St. Paul's river settlements—		
New Georgia	200	
Caldwell	200	
Brewerville	300	
Clay Ashland	400	
Louisiana	100	
New York	50	
White Plains	300	
Millsburg	250	
Arthington	300	
Careysburg	400	
Crozierville	100	
Bensonville	150	
Robertsville	150	
Harrisburg	250	
	—	3150
Settlements on the Mesurado river:—		
Barnersville, Gardenersville, Johnsonville, Paynesville ...		200
Monrovia		2500
Junk river settlements—		
Schiefflin and Powellsville	225	
Mount Olive	150	
Marshall	125	
Farmington river and Owen's Grove ...	300	
	—	800
County of Grand Basá:—		
Basá settlements—		
Little Basá	50	
Edina	250	
	—	300
Carried forward		7400

	Americo-Liberian population.	
Brought forward		7400
County of Grand Basá (*contd.*):—		
Hartford	50	
St. John's river ...	350	
Upper Buchanan ...	400	
Lower Buchanan (Basá)	600	
Tobakoni	50	
	—	1450
Coast between Grand Basá and river Ses ...		150
On the river Ses ...		50
County of Sinó:—		
Sinó Settlements—		
Sinó river	50	
Lexington	100	
Greenville	350	
Philadelphia	125	
Georgia	125	
	—	750
Settlements on Kru Coast—		
Nana Kru, Sete Kru, Nifu, Sas Town, Garawé		150
County of Maryland:—		
Settlements round Cape Palmas and on the lower Kavalli river—		
Rock Town	100	
Harper	500	
Philadelphia	100	
Latrobe	50	
Cuttington	100	
Half Kavalli	50	
Hoffman	50	
Middlesex	50	
Jacksonville	75	
	—	1075
Carried forward		11,025

	Americo-Liberian population.
Brought forward	
County of Maryland (*contd.*):—	11,025
Bunker Hill	25
Tubman Town	100
New Georgia	25
Hillierville	25
	— 175
Carried forward	11,200

	Americo-Liberian population.
Brought forward	11,200
Americo-Liberians scattered about Kelipo in far interior of Maryland County; in the Boporo country, near the Sierra Leone frontier, and on the upper St. Paul's river, etc., say	150
Total Liberians of American origin	11,350

There are a good many other native villages and small isolated settlements or farms of Americo-Liberians, which it would be tedious to enumerate by name. The ones and twos in such scattered settlements as these (such as Fish town, Puduke, Weabo, Pequenino Ses, etc.) may be taken as a set-off against any possible exaggeration of numbers in connection with the more populous places.

These Americo-Liberians at present constitute the governing caste of the country. In origin, about two-thirds are from the United States of America and one-third from the British West Indies. It is curious that in a general way the men who have come most to the front in the history of Liberia have been of British West Indian descent rather than emigrants or descendants of emigrants from the United States. They came, or their ancestors came, to Liberia rather to seek a profitable field for their enterprise than in any attempt to flee from conditions of slavery, or other kinds of unsatisfactory social environment. The Liberians of British West Indian origin have generally been removed one, or even two, generations from a condition of slavery. They are also for the most part better educated, and remember more as to their actual African origin than is the case with those whose immediate ancestors have come from the United States. For instance, the present President of Liberia, the Honourable Arthur Barclay, knows that the negro stock from which he sprang came from the district of Popo, now on the borderland of French and German territory, in the western part of the Dahome coast. English is naturally the universal language used by the Americo-Liberians. It is variously spoken by them, those originally of United States origin speaking it with a very strong "American" accent, while the Liberians who have sprung from the British West Indies talk English—that is to say, educated persons do—with but slight accent, and in the case of those who have received additional education in England, with no very obvious accent at all. A good deal of connection in sentiment is still kept up with the United States, though perhaps there is an increasing tendency, so far as higher education is concerned, for the despatch of young Liberians to study in England at such places as the Liverpool schools and the African Training Institute of Colwyn bay. But several local educational institutes are generously maintained by American philanthropists. The station of Arthington, on the St. Paul's river, is named after the celebrated philanthropist of that name connected with Leeds (Yorkshire), who did so much to establish the first missionary steamers on the Congo, and whose name is very gratefully remembered in Liberia for the assistance that he has given in educational work.

The indigenous population of Liberia, not of extraneous origin, may be estimated with some correctness at a total of about 2,160,000. They may be enumerated as follows:—

Locality.	Name of tribe.	Approximate numbers.
County of Mesurado	Vai	100,000
	Dé	10,000
North of the Vai	Bandi	200,000
North of the Bandi	Kisi	150,000
Beyond the Kisi people	Buzi	50,000
Beyond the Buzi, stretching over to the north-western and northern parts of the Republic ...	Mandingo ...	300,000 *
Behind the Dé people, along the St. Paul's river at the back of Monrovia	Gora	150,000
North and east of the Gora people	Kpwesi † ...	250,000
Beyond the Kpwesi, to the west and north, are the Buzi (already mentioned) and the tribe known as	Bere, or Bele ...	50,000
To the north of the Bere	Gizima and Buni	30,000
On the coast, beyond the Dé people of Monrovia, begins the big tribe of Basá people, and further inland the	Basá Gibi ‡ ...	200,000
South of the Basá group, along the coast from the northern limits of Sinó county to the Kavalli river, are the	Kru tribes § ...	375,000
Behind the Kru coast are the	Putu people ‖ ...	150,000
Behind the Grebo, in the Kavalli region (Maryland county)	Kelipo	150,000
Approximate total of indigenous negro population of Liberia		2,165,000

* It is probable that the total population of the various Mandingo tribes considerably exceeds this estimate, which is arrived at by putting together the computations of each separate branch, as given to me by its representatives at Monrovia. The proper pronunciation of the well-known tribal name Mandingo appears to be "Manding'a," or "Mading'a." They are a race that will play a very notable part in the development of West Africa. The whole of this tribe, which populates the hinterland of Liberia, parts of Sierra Leone, and the southern part of the French "Sudan," must number one or two millions. Their language is harmonious in sound and simple and logical in construction, therefore easily acquired. They are Mohammedans to a very great extent, only a few branches in the Liberian hinterland remaining pagan. In consequence, they dress picturesquely and suitably like the majority of Mohammedanized Africans in the Niger basin and the Northern Sudan, with wide breeches, voluminous tobes, and fezzes or round skull-caps. They are a fine-looking race as regards physical development, and their physiognomy reveals the secret of their power, namely, the slight infusion of Caucasian blood. They are, in fact, the result of an early intermingling of the Berber from the Sahara desert with the negroes of the Niger basin. They are a very industrious people, with a remarkable feeling for art, which is at present confined to elaborate leatherwork and the shaping of picturesque garments. The principal divisions of the Mandingo race in the hinterland of Liberia —proceeding from west to east—are the following: Boporo, Kwang'a, Mwela, and Dukwira. Their towns are nearly always surrounded by clay walls, the architecture of which, judging from such photographs as I have seen, is strongly reminiscent of the towns of Nigeria.

† This is the race named on most maps in the incorrect orthography "Pessy." It knows itself as Gbele, but for some reason is called by most of the surrounding tribes Kpwesi, which, on various grounds, is the most convenient name. A portion of the Kpwesi race is known as the Gbwalin, a name that appears incorrectly on our maps as "Barline."

‡ Behind the Basá and Gibi peoples one comes again to the great Kpwesi tribe.

§ The Kru tribes may be divided up under the following designations, but all the

The Americo-Liberians, of course, are Christians, belonging entirely to various sections of the Protestant Churches—Anglican, Episcopal Methodist, Methodist, Baptist, Presbyterian, etc. There is one establishment at Monrovia of the White Fathers, a Roman Catholic Mission, mainly French and Dutch in the nationality of its missionaries. So far, the fathers have made no converts, but the mission has only just been established. There is a good deal of activity amongst the various missionary societies dependent on the Protestant Churches represented in Liberia, and this is largely financed from the United States of America. The work is carried on almost invariably by missionaries having some proportion, large or small, of African blood in their veins. A good deal of their work is educational, and has certainly brought solid advantages to the coast negroes of Liberia. Outside the negroes of American origin, there are not many converts to Christianity. Such as there are come from the Kru peoples and the Grebo principally. Perhaps, of all the native races, the Grebo is the most Christianized and civilized. The Vai, some of the Gora, and nearly all the Mandingo peoples are Mohammedan—not fanatically, but very genuinely, as regards adherence to Mohammedan precepts. The spread of Mohammedanism in the western and northern districts of Liberia has been of immense benefit to the country, diminishing the traffic in alcohol and checking drunkenness, which elsewhere in Liberia is so common amongst the negroes—a drunkenness induced just as often by the native forms of alcohol (palm wine, etc.) as by the consumption of European spirits.

At the present time the ports of entry into the Liberian Republic at which foreigners may settle and trade are the following (running from west to east): Roberts Port, Monrovia, Marshall, Grand Basá, Grand Ses (Cess), Greenville, Nana Kru, Cape Palmas, and Kavalli. Foreigners also are allowed to trade within a zone of 3 miles along all the inland frontiers of Liberia. It is, I believe, the intention of the Liberian Executive to add to these recognized ports of entry places in the interior and on the coast as soon as communication has been opened up and the Liberian Government is in a position to maintain law and order at these places.

After the reading of the paper—

Mr. ALEXANDER WHYTE: I feel it is almost presumption on my part to say even a few words. We have not only listened to a lecture, and a very interesting one, on Liberia, but we have seen a regular panorama, a panorama of almost every subject you could think of connected with Liberia, and, I believe, absolutely the first that has been displayed before a London audience. There are many very interesting problems connected with the country of Liberia. Sir Harry Johnston touched, for instance, on the absence of mosquitoes from Liberia. A very extraordinary fact indeed; and any one who has travelled in tropical countries, as I have done for the last fifty-two years, and seen the natural habitat or abode and breeding haunts of the mosquitoes, would at once come to the conclusion that

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people included under these names do not extend further into the interior than about 60 miles from the coast:—

Sinó people	75,000
Sikong (beyond the Sinó)	100,000
Kru people proper (including all isolated colonies of Krumen elsewhere in Liberia)	140,000
Grebo people	60,000

‖ The Putu people seem to include the following subdivisions or separate tribes: Tatue, Nyapo, Pete, Tuo, and Gireo.

Liberia was an appropriate place, an ideal home for these pests. It is a curious thing that they are to be found on the coast, though not in large numbers, but for 8 or 10 miles inland, on the very ground where you would expect them to breed most, you find scarcely one, and it is the one redeeming feature in connection with travelling in Liberia that there are no mosquitoes. From a scientific point of view, it is a very interesting subject to go into. The general opinion, I think, is that what accounts in some reasonable way for their absence is that there must be some hostile bacteria in the swamps which affect or destroy the larvæ of the mosquitoes. Granting that such is the case, I have an idea—and I think it is quite feasible—that tons of that soil might be transported from these what you might call anti-mosquito swamps of Liberia and distributed in countries where the mosquitoes abound, to see if it would be successful there in inoculating or destroying the larvæ of the mosquitoes. That, I think, might lead to very satisfactory results. Sir Harry Johnston has given us a very good idea of what the aboriginal inhabitants of the interior were like. I travelled among them during two long journeys from the coast, and, according to my idea, they are a much more interesting people than those living along the coast belt. For weeks and weeks I have travelled through districts where no white man has been seen before, and naturally enough met with considerable difficulty in getting from tribe to tribe. They are very jealous and envious of one another, and their great object, when they get a white man among them, is to keep him there, and the difficulty is to get from village to village. Their great object is to do away with all roads and everything in the shape of a road or a bridge. And the one great thing is to overcome that jealousy and to allow a freedom of passage from village to village. Another interesting feature struck me very much, and that was that, although mosquitoes are not met with, there are clouds of midges, or gnats. Sometimes, especially in the afternoon, these pests are very troublesome, and we passed through several villages where they were to be seen in large numbers. But in one particular village, down the middle of the street, which was a green sward, there was a row of posts about 15 feet high, and on the top of these posts there was a hood made of palm leaves, and these hung down in a sort of conical shape with an opening below, very much like a bee-hive, and I saw thousands and thousands of little tiny birds flying in and out of these little cages, and they were engaged the whole day long devouring the gnats. I knew the bird at once—it was the little tiny martin or swift; and they had almost cleared the village of these pests.

If there is one feature connected with the black races in Africa more extraordinary than another, it is that they have no affection for domestic animals as pets. Their idea of domesticated animals, such as pigeons, fowls, goats, sheep, and all the rest, is very much the idea of what they call generally in the Bantu tongue "yama"—something to eat. But they have no real affection whatever for pets. I thought I had made a great discovery, and I was very proud of it, and I went up and down that village and made inquiries while our tents were being put up. I asked the headman, a very fine fellow, "What do these little birds live there for?" "Oh," he said, "Master Junglie man put up these houses, and dem little birds come and make plenty pickaninnies, which they eat." However, I got hold of the chief, and asked him about it, and he told me plainly and distinctly that they didn't breed these birds for eating, but they were kept there as a charm, and looked upon as birds of good omen, and that no one, not even a child, would be allowed to touch them. So that in this one particular at least the natives had evidently acquired a taste for keeping these swifts in a semi-domesticated state. And their presence added very greatly to the comfort of the inhabitants,

because of the destruction of these insects. I do not know that I have anything more to add, except to thank you for giving me an opportunity for saying a few words and to congratulate the lecturer on a very interesting paper.

The PRESIDENT: We have to thank Sir Harry Johnston for a most interesting paper, admirably illustrated, and we have also had the advantage of hearing some music of his friends from Liberia, and also of hearing an eloquent speech on the subject of the indiarubber trade, which we were probably not entirely able to understand. He has described to us the character of the civilization of the Americo-Liberians, and he has described the other tribes inhabiting that region, and the flora and the fauna of the forests, giving us altogether an admirable idea of that most interesting country. Its great product, no doubt, will be indiarubber. It is a subject to which I have given close attention during many years. Indeed, I introduced those valuable rubbers, the Para rubber (*Hevea*), and also the *Castilloa* of Central America, into India. I say those two rubbers are far superior to any rubbers from any other part of the world, but I believe the rubber of Africa comes next; at any rate, it will always fetch a good price. The trade will increase rapidly, the demand for it being enormous, and I cannot doubt in this respect there is a bright future for Liberia, and I am sure we must all wish success to those who are trying to open up the country. You will wish me to convey to Sir Harry Johnston a most cordial vote of thanks for his very interesting paper.

THE RUINS OF "HUANUCO VIEJO," OR OLD HUANUCO, WITH NOTES ON AN EXPEDITION TO THE UPPER MARAÑON.*

By REGINALD ENOCK.

DURING a recent journey I made a deviation of some leagues from my route on purpose to see and to examine, as far as time would permit, these handsome ruins. The plain of Huanuco Viejo, upon whose western verge the ruins are situated, is a remarkably level tableland, whose geological formation appears to be a quartzite and limestone conglomerate or compact gravel—at any rate on its northern and eastern edges—and the hills bounding those sides are vast cliffs of similar material, which I had hoped were auriferous deposits. The altitude indicated by my aneroid was 11,811 feet, and the temperature was not too cold to be comfortable, even in the tent at night. Sleep was, however, much disturbed from the necessity for continual vigilance in order to avoid the mules being stolen in the night. The plain has an exceedingly bad reputation as a resort of cattle-thieves and horse-thieves, and I was afterwards congratulated upon not having lost any of the animals by these midnight Indian robbers. My method was simple. Apart from keeping the arrieros awake, at any signs of fright upon the part of the mules—for they generally indicate in an eloquent manner the presence of a prowling robber—I lifted up a corner of the flap of the tent nearest my cot, and discharged a couple of revolver-shots into the night—a method which proved effective both here and elsewhere.

* For map, see p. 700, vol. 25.

On the following morning I started out early to examine the ruins, and found them very extensive. Unfortunately, the films of my little hand-camera had given out, and it was not possible to take photographs, but the sketches which accompany this will give a very fair idea of the architectural features of the ruins. Dimensions were obtained by pacing and compass triangulation, and it is not pretended that they are more than approximate. Most of the sketches were taken on mule-back, and were made as carefully as circumstances would permit.

The well-known Peruvian traveller of last century—Raimondi—visited these ruins, and in one of his works gives a brief description and a sketch thereof. The latter, however, is by no means faithful to the original. My friend, Doctor (of Laws) Cisneros, chief justice for the department of Ancacus, and who was Raimondi's companion in his travels in 1870, informs me, nevertheless, that they took careful measurements of these ruins, but which do not appear to have been published. In the work before mentioned Raimondi quotes from a previous historian, who states that "in March, 1533, Hernando Pizarro, the brother of the 'Conquistador' Francisco, arrived at the city of 'Guaneso.' It was a 'casa real,' or royal palace, built of large stones very skilfully set, and was so important in the time of the Inca that there dwelt there continually, for the service of the Inca, more than 30,000 Indians." The foregoing quotation I have translated from the Spanish of Raimondi.

The accompanying sketch (Fig. 1) will give an idea of the extent of the principal or central portion of the city. Beyond, nothing

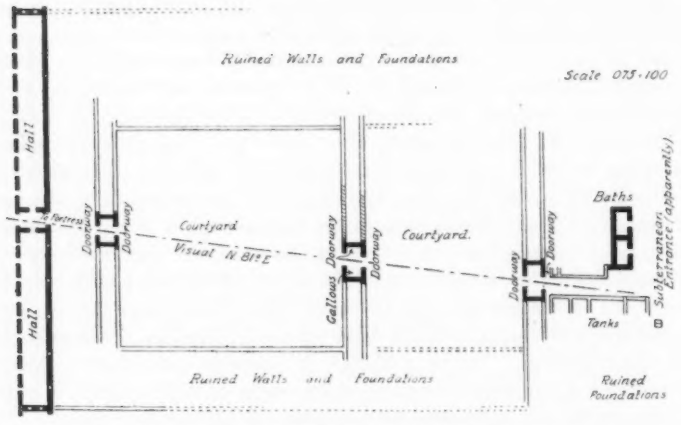


FIG. 1.—APPROXIMATE SKETCH-PLAN OF THE INCA PALACE.

remains but the foundations of numerous habitations. About a mile away, however, to the west, and built upon the limestone hills which rise from, or rather bound, the plain, are the foundations and streets

and walls of what has been a very extensive community. These are described later (see Fig. 11).

The architectural features which are most noteworthy are the stone doorways to the palace, and the castle or fortress. I made careful measurements of one of these doorways, which are shown in Fig. 2.

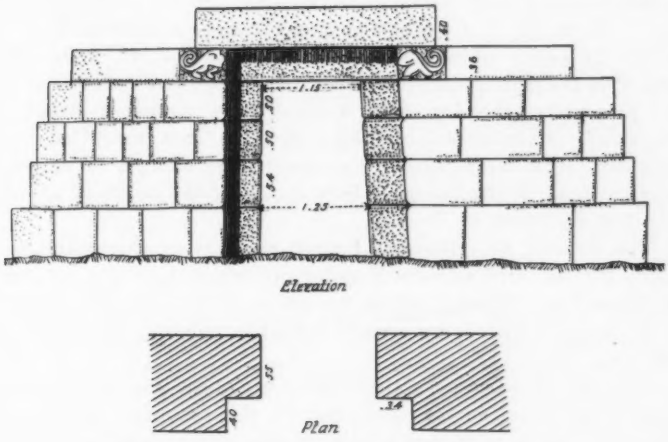


FIG. 2.—ONE OF THE DOORWAYS TO THE INCA PALACE.

The sketch Fig. 3 also shows the style of architecture. The stones which form this part of the work are very carefully cut and fitted, and it would seem that the builders have made up in laborious care and exactitude what they possibly lacked in skill or appliances. The stones have been worked, it is presumed, with copper tools, for the Incas were unacquainted, it is generally stated, with the use of iron. The joints of

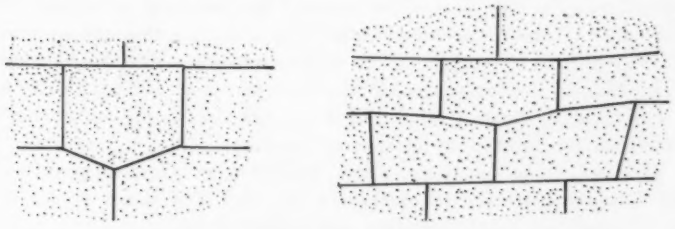


FIG. 3.—EXAMPLES OF MASONRY JOINTS, HUANUCO VIEJO.

the stones are so closely fitted that a knife-blade cannot be introduced, and no cement or binding material has been used. The bedding is not necessarily horizontal, nor the upright joints vertical, the stones having been cut to fit each other regardless of uniformity. Some of these

stones are of large size, as the lintels, which are monoliths of more than 2 metres in length, and of the whole thickness of the walls. The stones which form the "reveals" are often rebated in order to form bond.

The walls generally are about 3 feet in thickness. The stones appear to have been set in place, and the next or following stone fitted laboriously to its companion, as previously stated. Bond is formed by stones which traverse the thickness of the walls. The carving of the capitals, like most Inca carving, appears somewhat rude, and represents generally either a scroll or a species of lizard, or "lagarta." I cannot help thinking that the Inca scroll has been suggested by the large petrified "ammonites" so common in the limestone formation of the Andes. I have spoken of the fossils in another part of this account.

The faces of the stones still show what are undoubtedly tool-marks, for the hard silicious limestone of which they are composed has showed no alteration under the action of the elements. Rather it has acquired with age a beautiful faintish red tint, and a distinct polish.

I have elsewhere spoken of the ruins of the castle of Chavin (Plate II.), which I also visited for the second time on this excursion, and in this connection may be mentioned a belief or supposition among the natives with regard to the formation of the stones with which that castle is built. They state that these stones have been modelled, not cut; that the Incas weré acquainted with some herb, an infusion of which poured upon stone caused the latter to become plastic, when it was easily moulded into any required shape. It is stated that upon one occasion some individuals, having discovered a subterranean chamber belonging to an Inca dwelling, accidentally overturned an earthen vessel which they found there, and which contained some liquid. The contents, falling upon the floor, caused the stones of the pavement to become soft like "dough," and the aforesaid individuals, observing this, endeavoured to save a portion of the liquid, but without success. They then turned their attention to another similar vessel, which stood near by, also with a liquid, and, pouring a portion of this upon the stone, they observed that the latter resumed its usual consistency.

I do not know that there is any foundation for these suppositions, and only give them for what they are worth. The stones spoken of are, it must be added, certainly not formed of artificial material, as terra-cotta or concrete, but are natural stones.

In the east wall of one of the small chambers or passages of the palace exist two holes in the masonry, 6 inches apart, and about the height of a man from the ground. These, it is stated, were "gallows." A rope was presumably passed through these holes and around the neck of the condemned; the stones upon which he, or she

—for one side was for men and the other for women offenders—stood were then removed, and the latter left hanging by the neck.

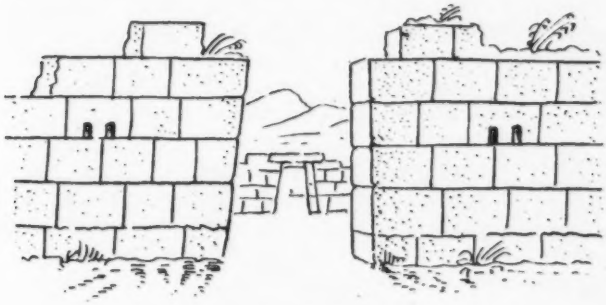


FIG. 4.—SUPPOSED INCA GALLOWS, HUANUCO VIEJO.

The "royal palace," if such it were—and there is no doubt that the Inca inhabited the place—is shown on Fig. 1. It consists primarily of two halls, each about 250 feet long and 30 feet wide, followed by two courtyards, to which access is gained by the portals or stone doorways shown on the plan. There are six of these doorways, all beautifully formed of cut stone, and all more or less alike. One of these is that shown in Fig. 2. They are of typical Inca style, with battered sides, and very solidly constructed. Possibly there is a suggestion of something Egyptian about them.

A remarkable feature about the plan of this edifice is that of the arrangement of the doors upon a "visual line." This may possibly have been accidental or undesigned, although I have heard it stated that it is the result of some certain purpose. The observer, standing at

FIG. 5.—RUINS OF THE PALACE, LOOKING EAST

the western side, or even near the fortress, has a clear view right through the openings, and in like manner from the eastern extremity—

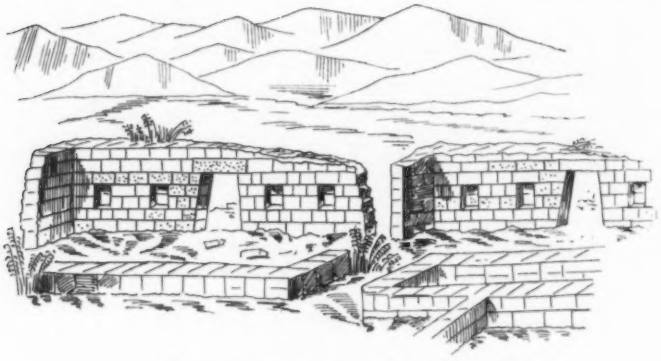
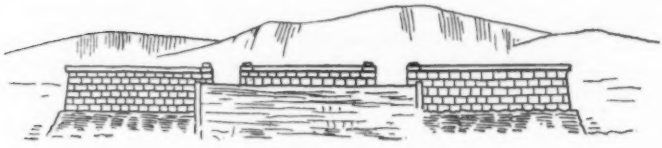


FIG. 6.—VIEW OF THE BATHS, LOOKING EAST.



Elevation

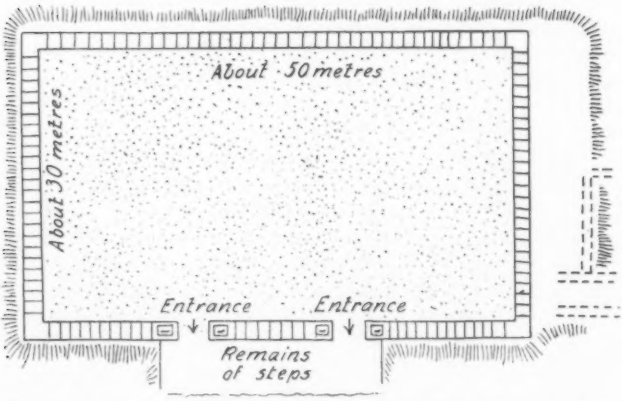


FIG. 7.—APPROXIMATE SKETCH-PLAN OF THE FORTRESS (POSSIBLY "TEMPLE OF THE SUN").

the baths—finds that his line of sight passes all these apertures, and rests upon the wall of the fortress in the distance. This is made clear upon the sketch (Fig. 5).

Only portions of the masonry are of worked stone; the rest are of unshaped, or very slightly shaped stones, but are nevertheless skilfully set and bonded. On the western face of the southernmost of the two "halls" are nine doors and window openings, occurring alternately, and on the other nine doors and no windows. On the eastern side are the baths, whose walls are all of carefully cut stone. These are shown on Fig. 6. All around this edifice are the ruins of numerous dwelling-houses, which, doubtless from their less careful construction, have not withstood, except in some cases, the destructive action of time. Moreover, the native shepherds are continually removing the stones to form "corrals." It is not possible to determine of what the roofs of these buildings were composed. There are no vestiges of timber remaining, and the construction is not such as to suggest that they were of stone, dome-shaped.

The fortress, or temple of the sun, is shown in Fig. 7. It is rectangular in form; very solidly constructed of cut stone blocks sur-

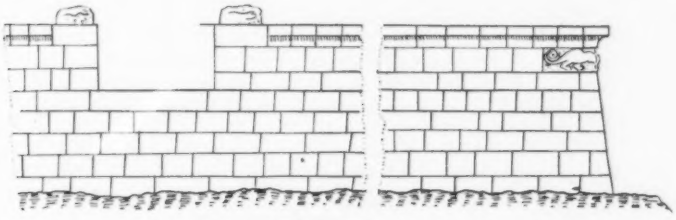
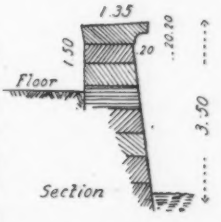


FIG. 8.—THE FORTRESS.



mounted by a cornice (see Fig. 8). It stands parallel with the other buildings in the centre of a large square, the ground rising slightly on all sides towards it (see Fig. 9). It does not appear to have contained any chambers or covered portion, although there are indications of what might prove to be a subterranean entrance on the east side. Neither here nor in any other portion of the ruins have there been any attempts at excavation, notwithstanding that, as this was one of the seats of the Inca, it is very possible that treasure lies buried. Some gold objects, I am informed, of exceedingly fine workmanship, have been accidentally discovered in times gone by, and I should consider it probable that search and excavation might well be repaid, for it is well known that the Inca always possessed quantities of gold, much of which was buried on the advent of the Spaniards.

The portion of the city separated from that upon the plain—or possibly at one time the intervening space also contained dwellings—is, as previously stated, situated upon some limestone hills to the west,

and overlooking the fortress and castle. These hills, it may be noted, are of very marked stratification, and large quantities of limestone blocks have been removed, doubtless to build the city below.

As seen by the sketch-plan (Fig. 10), this community consists of a series of "streets," if they may be so termed, or rows of houses, where the street or passage was upon the upper side of each row. Some of the houses are circular and, in the lower rows, some distance apart.

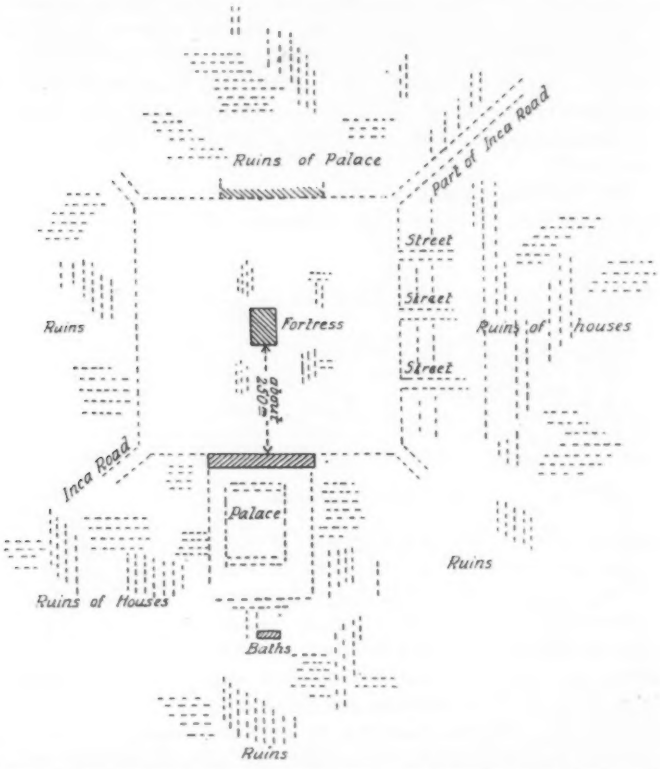


FIG. 9.—SKETCH-PLAN OF THE RUINED CITY. APPROXIMATE SCALE, 0·01 = 100.

Next above comes a row of circular houses only about 6 feet apart; still higher, square single houses, followed by several rows of square double houses. They are all about the same size—20 feet in diameter, or across the square. The walls are built of unsquared blocks of stone; the circular houses are true circles; the square with quoins at the angles, and with lintels roughly shaped over doors and windows. The stones are bedded in earth or mortar, all placed with care, and the

interstices fitted with angular fragments of stone driven in. The walls are about 2 feet in thickness. A small door on the upper side, about 1 foot 6 inches square only, gives access, and a small window on the lower, light. Undoubtedly, security against attack or intrusion was the dominant note of their construction.

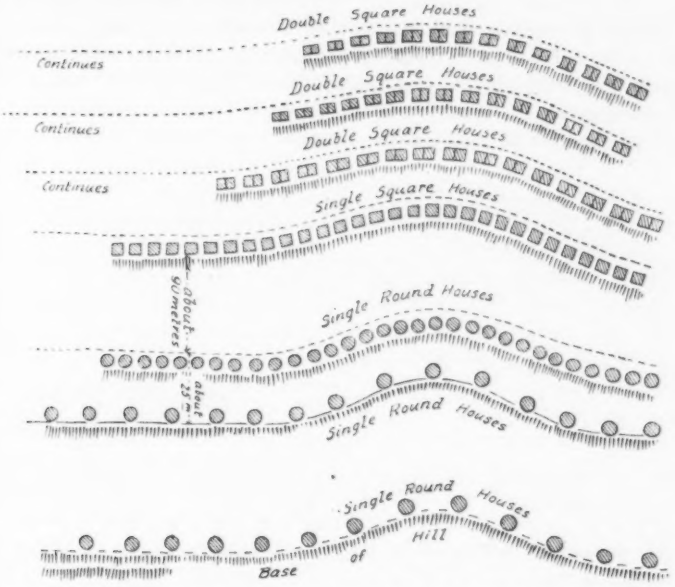


FIG. 10.—APPROXIMATE SKETCH-PLAN OF PART OF THE RUINS OF HUANUCO VIEJO.

I rode along these "streets" on mule-back, but time did not permit me to count the number of dwellings, of which there must be several thousand, as the rows continue for possibly 1000 yards around the hill to the south. There they stand, mute witnesses to a large population, which lived and moved and had its being in centuries past, and whose vestiges are now but—

"Blown about the desert dust,
Or sealed within the iron hills."

On the plan (Fig. 9) is marked the "Inca road." I followed this road for a short distance, and, in fact, portions of it still form the means of descent from the plain to the river Vizcarra, an arm of the Marañon. It passes down a steep ravine, and is formed of circular steps of unhewn stones. This descends to the river near the town of Aguamiro, or La Union, a distance of a few leagues, and passes the river Vizcarra by a bridge, only a portion of the original abutments of

which remain. To the east of the ruins runs the river Marañon proper, beyond the hills shown in the sketch of the baths, looking east, and the Inca road continues to the river, crossing it at its exit from Lake Lauricocha, the source of the Marañon, by a well-preserved Inca bridge formed of slabs of stone.

Time would not permit me to devote more than one day and a half to the ruins, which are worthy of more study than I was able to give. Possibly I may have committed some errors in description; for example, what is generally termed the "fortress" may really have been the "temple of the sun," for such existed in the city. I was obliged to push on to the south to reach a point some 5 leagues away.

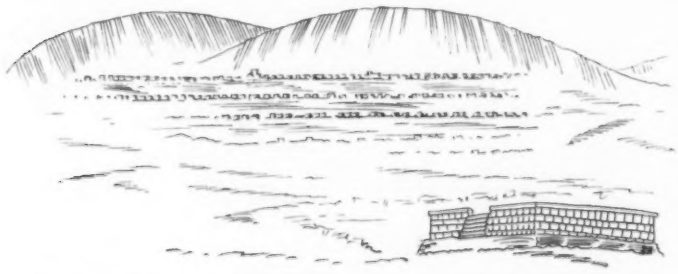


FIG. 11.—DISTANT VIEW OF CITY ON THE HILL, HUANUCO VIEJO. FORTRESS IN THE FOREGROUND.

and evening was falling when I gave the order to strike the tent and load the mules.

Very picturesque and impressive was the place as the long shadows fell across the tableland, the sun's disc nearing the western horizon upon the hills which crown the Vizcarra. The clouds, a scarlet curtain of rare and filmy texture, strove as if to hide his exit, and from below, rather than from above, appeared the shades of evening. Already far away appeared like dark spots upon the plain the forms of my mules, the cries of the impatient "arrieros" lost in the distance, and the only living beings upon the spot were myself and the mule I bestrode. Some attraction of contemplation, born of the influence of the dying day, held me momentarily to the place—contemplation of those old, sad vestiges of a perished civilization, for the ruined handiwork of man is ever fraught with serious cogitation to thinking man. That strange old monarchy, that industrious race, before whose habitations I stand! They are gone. What part have they played in the scheme of a universe, they whose only vestiges are these stones?

The light faded from the western sky; save that pearly tint of momentary beauty following the after-glow; and a single star, dominant of the horizon, gleamed like a pale jewel against the vault

of heaven, whilst the purple haze below, which slowly grew to being, brought silence, night, and solitude. The breeze whispered among the deserted halls of the Inca; the wild oats growing above the entablature swayed softly, as if they murmured, "As a flower of the field so he flourishes; for the wind passes over it and it is gone; and the place thereof shall know it no more!"

As will be seen by the map, the Marañon divides near the town of Paches, one branch descending from the south, and the other from the south-west. The former is the Marañon proper, and at this point is only about 50 miles from its source—Lake Lauricocha. The latter is termed the "Vizcarra," and has its origin in the Cordillera of the Andes, near Huarapasca.

Almost the whole of the district described in these notes is included between the parallels of lat. 9° and 10° S., and is bounded approximately, on the east, by long. 75° 40′ west of Greenwich.

After leaving the town, and head of Province, of Aguamiro, upon the Vizcarra, I arrived at Huallanca, a small place which is of growing importance, due to mining development and enterprise. In this neighbourhood are very extensive deposits of anthracite coal in the quartzite formation, which in some near future time must cause this region to become important. Also the ores of copper, silver, lead, zinc, etc., are abundant. The coal formations are very marked, and in many cases stand vertically within their enclosing strata, which latter have been here very much upheaved and distorted. They tower up to a height of hundreds of metres above the river, and from their topographical formation so lend themselves to economical mining methods that undoubtedly Peru must some day become an important coal-producing country.

Leaving the Vizcarra on the west, near its headwaters, I arrived within a short distance of my objective point—Chonta, when a fierce snowstorm overtook us, and caused us to lose the track. On many of these mountain uplands, or "punas," interminable swamps exist, and across these we floundered for hours, on several occasions nearly losing some of the pack-animals. One of these almost disappeared with its load in a treacherous place, and was only saved by superhuman exertions. Shortly afterwards another, in crossing a bog, went down, and in struggling overturned its load of provisions and utensils. Freeing itself partly, the animal bolted, dragging after it its burden, and disappeared, in spite of our efforts to stop it, around the base of a hill. Whilst the muleteers pursued it, I rode over the track "locating" the utensils, such as pots, the frying-pan, cups, spoons, packets of flour, sugar, and coffee, and divers such articles, which were strewn among the snow. Night was upon us; there were no habitations and no fuel in the vicinity, for the only combustible in those high "punas" is the dried grass. There was nothing for it but to face

circumstances as they were, and I gave the order to clear a space from the snow and plant the tent. The altitude was more than 15,750 feet, something less than 3 miles vertically above sea-level! The icy blast blew through and through us, and the water poured in beneath the bottom edge of the canvas. Just previous to this my mule had slipped and fallen, rolling on to me, not doing me more injury, however, than that of a broken finger, the pain of which by no means detracted from the discomfort which I experienced.

But the traveller who has chosen the winter time for his travels in the Andes, against the advice of his friends, must make light of the consequences, and I ordered a trench to be dug on the upper side of the tent, which prevented the water entering and further wetting the bedding, etc., whilst the snow shortly covered the canvas to a depth of a foot and afforded protection from the cold. A small alcohol lamp which I carried for emergencies, afforded the means of making coffee, and I was able to obtain a few hours' sleep; my only preoccupation being for the unfortunate mules, who, exposed to the gale, found but little fodder for the depth of snow.

My three "Cholos," who had been my only companions during this arduous expedition, resisted uncomplainingly the hardships they were called upon to suffer. Wet to the skin and exhausted with the pursuit and capture of the mule, they nevertheless put forth every effort towards securing the comfort of the "patron," for I have always been fortunate in being able to attach these faithful fellows to me by simple methods of strict justice towards them.

On the following day all my hardships were forgotten and rewarded on the examination of my concession in Chonta, which proved to be of great value. It embraces a large area of cinnabar-bearing formation, and may prove to be one of the most important quicksilver mines in the world.

The altitude is 14,600 feet, and the place is stated by Raimondi, in his work published in 1874, to be "one of the highest inhabited places on the globe." The mines were discovered in 1756, owing to an order by the Crown of Spain for the search for new quicksilver-mines, and in the past have produced a great deal of this metal.

From Chonta I obtained a view of the hills which bound Lake Lauricocha, the source of the Marañon, only about 20 miles distant from where I stood, and on the south-west arises a magnificent series of snow-capped peaks, whose name I was unable to obtain. I could not sleep here during several nights, owing not so much to the cold as to the exceeding rarefaction of the atmosphere. The organs which are affected, however—the heart, the lungs, the brain—soon accustom themselves to their environment.

It was a source of much regret to me that I was unable to arrive actually at the lake, but it was impossible. My men were worn

out with constant exposure, and ill with "tercianas," or intermittent fever, and could no longer endure these high altitudes. The mules were not in a condition to pass the swamps between us and the lake, for the roads, due to the exceptionally rainy season, had become converted into such, and the only fit member of the party was now myself. However, I have to visit the region again shortly, and in the proper season these difficulties do not occur. But I beheld the blue hills above the lake as a sort of "promised land," to which I had been denied admission.

From this point I began my return journey to Huaráz, passing the summit of the Andes again at another point—the pass of "Huarapasca,"* altitude 15,666 feet. The end of March was approaching, and the expiring winter seemed bent upon expending its last fury upon the head of the traveller who had defied it in its stronghold. For eight long hours, as I passed the summit, the wind and snow and sleet came out of the west in long horizontal lines, converging, apparently, upon the track where I descended. For eight long hours we plodded on without once descending from the saddle, except for an instant near the summit to rearrange the pack-mules' burdens. Between those tearing tempest-clouds the sun flashed out for one brief moment, lighting up that labyrinthine wilderness of eternal snows, the roof of the world, and flinging strange shadows upon the appalling terraces of that vast solitude.

It was but a brief respite. The thunderclouds gathered in front, the lines of descending snow again increased their vigour, and the winter lightning flashed. The gathering volume of the stream in front of me, which formed the "road," hissed angrily as it brushed aside the pebbles in its path. The scene was changed again. "And such a change. Oh, night and darkness, thou art wondrous strong!" For the Andean night closed in, and the weary pack-mules could scarce advance. A shepherds' cottage—incredible that these people live at such an altitude—gave shelter at length, and permitted the preparation of some "breakfast," for it was the first meal we had been able to partake of.

But I could not sleep. The cold and the rumbling of the avalanches on the peaks behind the house drove sleep away.

At 5 a.m. I stood outside the wretched hovel. Will the morning never come? The cold is intense, the breeze freezes my finger-tips and ears, and scarcely the faintest gleam comes from the snow beyond. Will "the day-spring from on high" never visit us? It comes as I stand there! In the east a faint light appears through the driving snow, and from behind a distant hill a tearing veil of cloud makes way for a lake of blue, and in an instant closes again as if reluctant to release the firmament from its dun dominion. Will day never dawn? Again the icy breeze blows past, and I feel faint for lack of food and

* Pronounced Whā-rā-pas-ka.

sleep. "Get up, lazy animals, and make my coffee!" This to the sleeping "cholos," who roll over and arise.

At last the day. I do not wonder that the ancient Incas worshipped the sun. A beam shoots upward—the arm of the sun-god, a sunbeam, and banishes the hungry clouds of night. It grasps the veil of darkness and hurls it aside; the mists roll off adown the valley; the eternal snow upon the everlasting peaks fast tinges with a rosy light; the tint is reflected, is flung into the western sky; a bird twitters among the grass and snow. It is day!

We journey onward and downward. The formation is limestone, and I halt for a moment to sketch a huge fossil "ammonite," which stands facing the road like a stone carved with an Inca scroll.

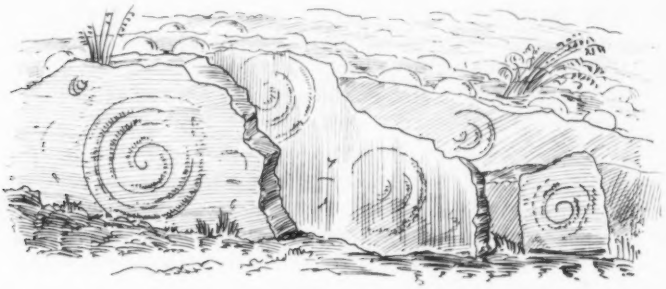


FIG. 12.—FOSSIL AMMONITES IN THE ANDES, 14,764 FEET ALTITUDE.

The number of these fossils at this point is remarkable; they stand in rows like an arrested and petrified "school," in marked vertical strata, or series of strata, which run north and south. Their diameter, or at least that I measured, was 2 feet 8 inches across the curved portion. The nucleus, or central portion, appears to be better preserved than the rest, and hundreds of these centres, in the form of flattened spheres, strew the track as it runs across the formation.

Still we descend, and the streams now flow westward, carrying their *débris* to the Pacific ocean. The traveller is witnessing in these heavy storms the formation of new "horizons," and, relatively of course, the Andes are being worn away before his eyes. The head of a valley is reached, and I am tempted to sketch some of the natural "reservoirs," or lakes, the remarkable symmetry of whose enclosing moraines seems the work of man in an artificial embankment. Some of these are 160 feet high.

There are three cordilleras to be passed by this route, that is to say, three "undulations" of the cordillera, and after two days' riding we descend to the plain or "pampa" of Lampas. This plain, which is some 10 leagues broad, is remarkable for its exceeding flatness,

HEAD OF QUILCAY VALLEY, NEAR HUARÁZ.

PANORAMA OF HUARÁZ, LOOKING EAST.

stretching away before the view of the traveller to where its horizon-line cuts the base of the hills which bound it. It is of a gravel formation, partly auriferous. On its south-westerly side is Lake Conccocha, the source of the river Santa, which, as before stated, flows north-westerly to the Pacific ocean, down the valley of Huaylas. The hills above this lake are of somewhat remarkable forms of volcanic rock, and various metalliferous ores are found there. The altitude of this plain and lake is 13,124 feet.

From this point to Huaráz the road follows the verge of the river, a distance of about 16 leagues, passing in turn the towns of Ticapampa and Recuay, where a good deal of mining—principally silver ores

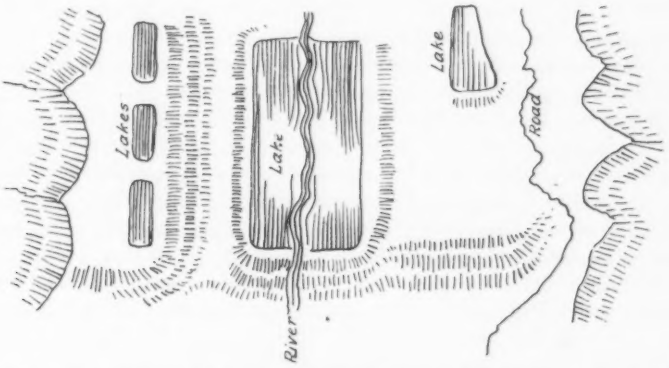


FIG. 13.—NATURAL LAKES IN ANDEAN VALLEY (TERMINAL AND LATERAL MORAINES).

—is carried on. The river was in flood below the lake where we passed, and one of the mules was nearly carried away. A survey has been made for a railway along this valley to Chimbote on the coast, and would undoubtedly form a paying enterprise.

The buildings and towers of Huaráz, as I approached it, seemed, after the primitive places where I had sojourned, to form a "grand metropolis," such is the effect of comparison. The panorama (Plate I.) gives an excellent idea of the city seen from afar. I was glad to arrive. I was weary of battling with the elements; my mules were in need of rest and good fodder; my men anxious to be with their families. My spurs were worn down to the rowels, and my indiarubber cape absolutely rotten with continued wettings; and the prospect of a comfortable bed, clean surroundings and good food, and other usual adjuncts of civilized man, were most alluring.

The religious processions in Huaráz, for the "Semana Santa" (holy week), were near at hand, and in these interior towns of Peru the ceremonies of the Church are carried to extremes. These matters, however,

are principally perpetuated by the priests and the Indians, the upper class standing aloof. Life-sized figures of "Jesucristo" and the soldier-executioners are arranged on a large platform, and borne through the streets on the shoulders of Indians. In this connection, it is to be observed that the Indians do not reverence these images as such, but declare that they are the *actual personification* or embodiment.

Religious objects of the Incas were recently discovered close to Huaráz, in a subterranean temple, part of which still remains. The objects were found upon an altar of curious conical form, having beneath it an apparatus for acoustic purposes. They consist principally of discs of gold, silver, and copper, tied together with a ribbon of gold, strong and flexible; cylinders of the same metals, similarly secured; shells formed of delicate leaves of gold; two porphyry figures representing some animal—bull or lion; and two sea-shells.

The occurrence of the three metals mentioned, which always appear among Inca traditions in the neighbourhood of this part of Peru, has a special signification. The Incas of this region were not necessarily sun-worshippers, but adored an imaginary being, whom they termed "Vira-cocha." There was no tangible representation, exactly, of this deity, and the translation of the word signifies "lake-foam," the idea being to represent something beautiful, ideal, pure, and intangible, yet real and possible. The Indian word *Misti*, which in Spanish is rendered "caballero," was also used to convey the sense desired, and the only possible word in English which could express this idea is "gentleman," but in its highest and true sense. Their "god," therefore, was "a gentleman," and it must be conceded that not many higher ideals have existed among the beliefs of the nations of the world.

To return to the gold, silver, and copper. The "genesis" of these people, or history of creation for them, was that there fell from heaven in ages past an egg of copper, from which, upon its reaching the earth, the first Indians issued. After a time a second egg fell, of silver, from which sprang the "Nushtas," or nobility; whilst again, after a long lapse of time, a third egg, but of gold, also fell, and from this came forth the Inca. It is to be observed that the "sacred number" of three is represented in this genesis.

To conclude, I have only lightly touched on the inexhaustible and interesting field which this part alone of Peru offers, and the territory which I have endeavoured to describe is but a portion of the vast area of the republic.

THE UPPER MARAÑON.

Some Notes upon an Expedition thereto.

Towards the end of March, of the present year (1904), I returned to Huaráz from an expedition to the upper Marañon and the region bordering thereon. The primary object of my journey was to examine and take possession of some gold and quicksilver-bearing concessions, which I had acquired previously; but in addition I desired also to study, as far as time would permit, the general geological conditions of the district, as well as to become acquainted with the ways of the natives, and to visit some of the numerous ruins of the bygone Incas, which exist in great abundance there.

In a paper recently read before the Royal Geographical Society (*Journal*, vol. 25, p. 620), I gave a brief description of my passage of the Andes near the city of Huaráz, and some photographs which accompany this account will enable an idea to be formed of the character of the region I traversed. Unfortunately, some of the best of those which were taken *en route* were spoilt by the breaking of the negatives, and could not be reproduced. I also spoke in that paper of the peak of Huascaran, which towers upwards in its rare splendour slightly to the north of Huaráz. The name of "Huascaran" was given to the mountain by Raimondi; its real name, and that by which it is known among the Indians of the vicinity, is "Mata-raju," which means "the double point of snow," for it presents two peaks.

It has not been the writer's good fortune to know, with the exception of the Sierra Nevada of California, and the snow-capped volcanoes of Mexico, any of the great mountain ranges of the world other than the Andes, which he has crossed some seven or eight times, and therefore he is unable to make comparison therewith. Other travellers have doubtless decided as to the relative grandeur of the world's mountain-chains, but the varying magnificence of the Andes, with the changes of form due to different geological formations, must ever command the admiration of the beholder.

I have always the feeling, when standing on these stupendous summits, of being "on the edge of matter." What are they for, these edges and films and threads of snow, pointing upwards; these strange saw-teeth with which the world seems to be ploughing its way through these huge soft masses of cumulus vapour which extend before, beyond, around, and below me? I seem to stand on the top of this sphere, and to feel it floating in some sustaining medium!

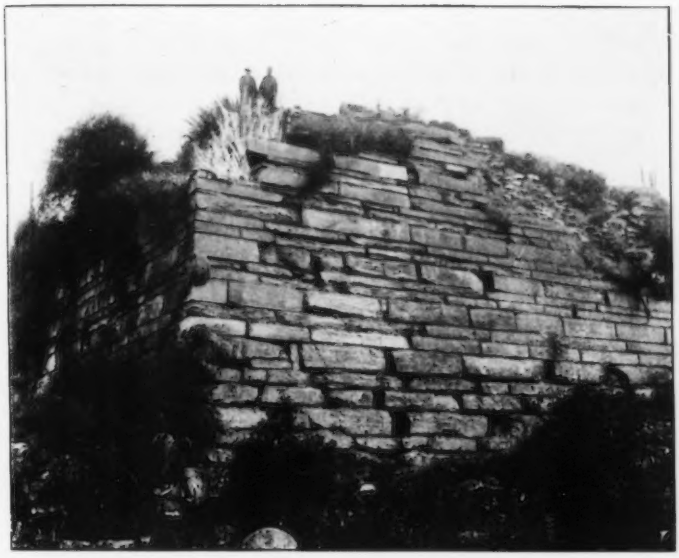
Between two rock-masses below the summit of "Mata-raju" our trail passed in the descent of the eastern slope (16,076 feet). Night was beginning to fall, and we sought shelter in a spacious cave in the valley below.

The out-of-the-world town of Huantar is one of the most primitive places that can be imagined; the chief feature about the inhabitants is the prevailing deformity known as "coto," or technically "bocio,' and consists of an enormous double swelling of the neck, which hangs down like great pouches. This strikes pity and disgust into the mind of the foreigner, especially when it is known that the disease has its simple remedy in the use of iodine, and results solely from negligence and lack of initiative on the part of the better members of the community. Here is a field for a self-denying doctor, who would sacrifice himself to dwell among these poor and backward inhabitants of this district.

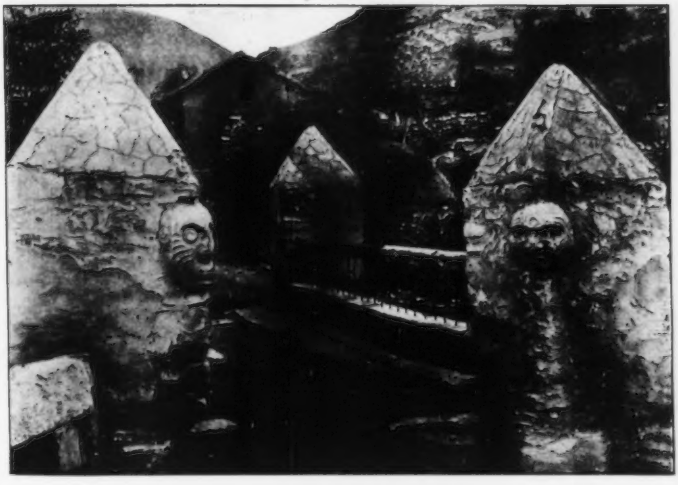
Near this town are numerous ruined habitations and fortresses of the "Gentiles," as the present inhabitants of Peru term the ancient dwellers of the country; and in the quartzite formation are numerous silver and silver-lead mines, which, however, are scarcely worked by the modern Indians. Some veins of bismuth are also encountered near here; coal too occurs. The name of this town is derived, I was informed there, from a corruption of the Spanish words "Aguantar ó Reventar," meaning literally "Suffer, or burst;" this having been the mandate of the Spaniards in that neighbourhood, who forced the Indians to abandon their dwellings in the almost inaccessible hills and to form a town on the plain below, the actual site of Huantar.

At the foot of the Cordillera is the castle of Chavin. These ruins are of much interest, and worthy of study. They are quite extensive, principally subterranean, and have been built of squared stones carefully set. I had but little time to examine these ruins, intending to return later. The portion I examined consists of a series of small square underground chambers, communicating with each other by passages, and also by curious small horizontal "shafts," not large enough to admit the body of a man. It is stated that below these chambers exists a similar series; and certainly, upon looking down a hole which had been formed, accidentally or by design, in one of the passages, a space or chamber was apparently observed. It is difficult to know what purpose these apartments served; possibly they were dungeons. In one of the passages is a stone column with characteristic Inca scroll carving upon it, circular in form, forming a monolith of considerable size. Some time ago efforts were made to extract this stone, but it was found that it penetrated the ceiling of the passage above, and extended downwards to an unknown length, and absolutely could not be moved. In the park of the exhibition in Lima is a large circular "calendar" stone, which was taken from these ruins and conveyed thither. I repeat that these ruins are worthy of serious examination, and some work and excavations would undoubtedly disclose matters of interest, and possibly unearth some treasure.

Close to the castle is a bridge, which was built by the Incas,



INCA RUINS AT CHAVIN.



INCA BRIDGE NEAR CHAVIN.

spanning a stream which descends from the Cordillera. The principal feature of this structure is that the floor is composed of single slabs of stone from 12 to 16 feet in length. The photograph of this bridge is somewhat defective, but an idea may be formed of its structure thereby. The four pillars at the corners are modern, and the carved stone heads built therein were taken from one of the subterranean chambers of the castle, and are good examples of Inca carving (Plate II.).

In Huantar I lodged as the guest of the "governor," or "gobernador," the petty authority of the place. I there observed the method by which the Indians make their complaints or "state the case" in any question they may have to lay before him. Before presenting themselves, they arrange the formula in which the plaint is to be delivered, concocting certain phrases which they deliver, all speaking at the same time, the same words, in a monotone, reiterating the phrases without any pause; this in the "Quichwa" dialect, and it lasts some ten or fifteen minutes, during which the "gobernador" listens patiently and judicially, and then announces his decision. The complainants may, for example, have come to supplicate for the release of some friend or relative who has been confined in jail for some petty theft or misdemeanor, and the plaint may take this form: "Tete" (father), "permit that our dear relative be released; Tete, permit that our dear relative be released; Tete, etc., etc.," *ad infinitum*. If any one of them fails to perform his part in the chorus, or has done it perfunctorily, the rest, upon leaving the presence of the authority, fall upon him and thrash him soundly with sticks, saying, "Thou hast not fulfilled thy part; thou art useless."

In these remote towns, the Church and priestly influence plays an important part, and both are matters of wonder to the foreigner. The edifice, which is generally built in a primitive manner of "adobes," is stocked with gaudy images and tinselled trappings of every description, crude and grotesque. The day I visited the church of Huantar was some saint's day—I forget which—and the building was filled with vegetables and earthern pots of "chicha," the native drink made from maize. These were not, however, presented as a "harvest thanksgiving," but were placed there in order that "the spirits of the departed might not suffer hunger;" and really, in the belief of the donors, the comestibles were to satisfy the hunger of their relative who had died, wherever they might be imagined to be at the time. I met one old Indian woman as I left the building, staggering under the weight of an enormous earthen jar of this beverage—chicha, and to my question she replied, in broken Spanish, that her beloved husband had been fond of "chicha" during his life, and that she feared he might be in need of the same refreshment now! It is a fact that the priests permit and even encourage this superstition in some places, themselves making use of the articles afterwards. When I mentioned

this matter to the "gobernador," he professed to be very indignant, as it was "against the law;" and he made a show of going—as he said—"to have the whole church cleared out." I suspect, however, that this was only for the benefit of the "Ingles," and this suspicion was strengthened on partaking of part of a fat fowl at table later, which I recognized as having seen in the temple!

To describe the remarkable customs and superstitions of these poor and backward people on the eastern side of the Andes would occupy too much time and space. They inspire me with pity. "Knowledge to their eyes her ample page, rich with the spoils of time," unrolls so infinitely slowly for them. They have the weight of centuries upon them, dragged down by the chain of deadly ignorance, inheritance of their Iberian conquerors.

I have accomplished the journey from Huaráz to Chavin in one day, but it is a very hard day's ride. The distance is only about 14 leagues, but the main range of the Andes has to be passed midway, and from Huaráz one rises from 9908 feet to 15,256 feet, the summit of the pass of Yangshallas, and descends again to 10,500 feet at Chavin, a steep and trying "road," where a horseman is generally pelted for hours with drifting snow, and chastised by the bitter blast.

Beneath this summit, by means of a tunnel, would pass the Pan-American railway, according to a survey made some years ago. Although the summit of the pass is above the perpetual snow-line, it is a rather remarkable fact that the snow-cap does not cover the road, notwithstanding that it lies on either hand at a distance of a few hundred metres. I have been informed by the natives that the snow-cap existed here formerly, but that "the snow disappears always from the immediate vicinity when there is continual traffic," presumably due to the continued presence of living beings. Whether the hypothesis is well founded or not I am not prepared to say; but it is to be noted that the same fact has been observed on other passes which cross the same range; for example, that of "Huarapasca," some leagues to the south, which I speak of later.

The formation here is limestone, which stands up in enormous vertical strata, and numerous small lakes occur, generally presenting the appearance of having been artificially dammed up by embankments, which are really moraines left by the retiring snow-cap. In this connection it may be observed that, according to the observations of the people of the region, the perpetual snow-cap has retired and diminished very notably during last century, at least upon this portion of the Andes.

I have again to confess that the photographs taken here were not a success, and I must have recourse to my note-book for a sketch of the formation (Fig. 14). Nearing the summit the roads are formed by a series of rude steps excavated in the rock, or piled up of flat slabs

of stone. In the background on this particular summit are peaks of pronounced and often curious form, and the contrast of the marked stratification of the rock and the dazzling surface of the snow is striking.

The lake-formation near the summit is interesting as showing the probable origin of springs in the regions below, the thawed snow entering the lines of cleavage of the vertical strata, and being conducted thence to lower levels.

These "appalling ramparts" of nature tower heavenwards at all angles, and frown down upon the narrow way in stern rigidity.

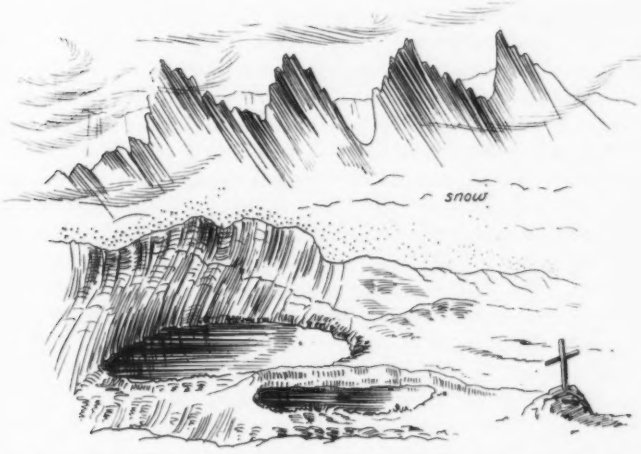


FIG. 14.—SUMMIT OF THE ANDES, SHOWING STRATIFICATION AND LAKE-FORMATIONS 15,256 FEET.

The small lakes in the sketch are exactly at the summit. On the left-hand side (the east), the waters of the melting snow gather in streams, and descend to the tributaries of the Marañon, finding their outlet a thousand leagues away, by the Amazon, upon the Atlantic coast. On the right-hand side they flow to the river Santa, and debouch at Chimbote in the Pacific ocean.

At the foot of the Cordillera exist some thermal springs, which the inhabitants of the village of "Olleros" use—very occasionally, I suspect, judging from their appearance—as baths. This village is on the western side, and is chiefly famous, or rather infamous, for its cattle- and horse-thieves. I had the satisfaction of seeing a gang of these individuals taken into custody. Many a sleepless night have this fraternity caused me and my men on these roads of the interior, necessitating constant vigilance to avoid the robbery of our animals.

I observed that wooden crosses were placed at the summits, and, in fact, the sacred emblem is in evidence in Peru even in the most inaccessible places, as, indeed, it is throughout Spanish-America generally. Whether it be to indicate a summit, to mark the leagues on a mountain road, the position of a spring or well, or to hold in reverence the wayside spot where some tragedy has occurred—for whatever object it be, the devout Indian has not failed to preserve it there, where it stands in silent sentiment; it confronts the view, and from the chance wayfarer—

"implores the passing tribute of a sigh!"

and no hand, however ruthless, thinks to disturb it.

But the cold and inhospitable summits of the Andes are past, and I have planted my tent on a green meadow where the Marañon rolls by, where the warm rays of the sun fall comfortingly upon us, drying our clothes and bedding, long wet and heavy from days of rain and snow. The famous river at this point is small, and resembles rather an English river, whilst overhead are the azure expanses and cumulus cloud-masses of a "Devonshire" sky. The valley slopes are cultivated with maize and potatoes, and numerous villages on the banks, with their white walls and red-tiled roofs, give at a distance an air of smiling prosperity. This latter characteristic, however, always vanishes somewhat upon entering the streets, when the poor and primitive method of living of the inhabitants becomes evident.

I have passed in succession the towns of San Marcos, Puntou, Punchao, the village and bridge of Chuquibamba, above which the first view of the Marañon is obtained, Chavin de Pariaca, Tantamayo, Yanas Pachas, Ovas, Silyapata, and others whose names and altitudes are recorded in my note-book.

All these towns, or rather villages, are more or less of a similar type. They consist generally of a small "plaza," or public square, with the temple on one side, and the streets radiating therefrom after the usual Spanish-American style, which is too well known to require description. Here the houses are of "tapiales," a construction in which the earth, wet, is rammed in between planks set upright, so forming walls, after the style of concrete construction.

The bridge of "Chuquibamba" is on the road to the "Montaña," or tropical interior of the country. The bridge is a primitive affair formed of logs covered with twigs and soil, before entering upon which the prudent traveller will alight, lest the horse or mule he bestrides break through the fragile covering with its hoofs. The altitude of the river at this point is 9023 feet above sea-level; the climate is generally mild, and might be compared to that of the south of England. The width of the river is generally about 90 feet here, but at the bridge narrows between the outcropping rocks to a few feet, the channel,

however, being correspondingly deep, as shown by the following section :—

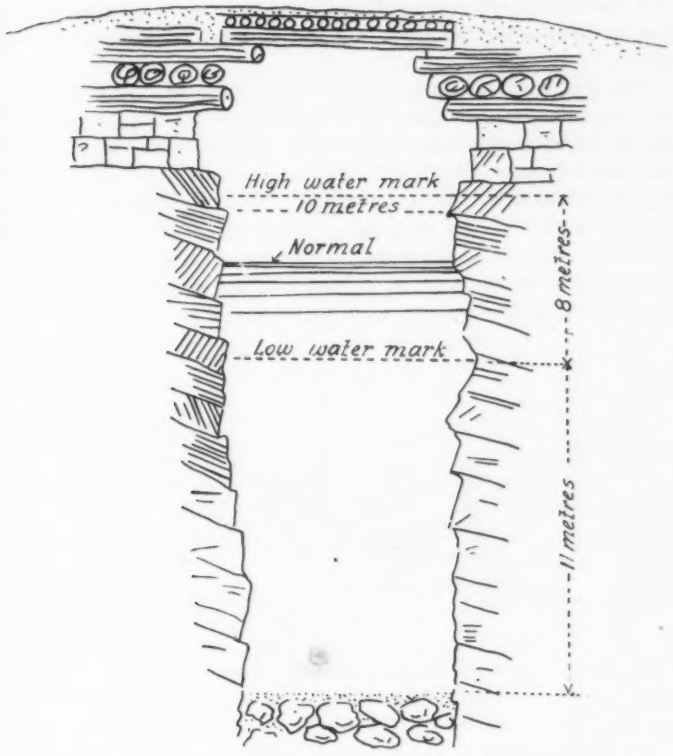


FIG. 15.—CROSS-SECTION OF RIVER MARAÑON AT CHUQUIBAMBA.

The flow of the current is swift at this point, and I was nearly carried away on one occasion whilst swimming in a pool above the bridge. The flow, or volume, according to my gauging in January, was approximately 1000 cubic feet per second.

The river is famous at this point above all for the occurrence of gold in its bed, and, in fact, the principal occupation of a number of Indians here is that of gold "washing," or extraction, both by men and women. I have personally obtained gold-dust and small nuggets from the gravel at the verge, and, in fact, a portion of my concession covers this part of the river. I have purchased from the Indians on several occasions nuggets of gold weighing up to half an ounce, and there is not the least doubt that great wealth is contained here. Below the bridge the

river widens out into a species of "whirlpool," which, according to the Indians, contains a vast quantity of gold, deposited by the current. Years ago some persons endeavoured to examine the bed here by means of a diving-suit, and I am informed, but have not been able to vouch for the truth of the rumour, that one of them perished beneath the waters.

The geological formation of the valley of the Marañon (Fig. 16) in this region is a talcose slate, occurring in thin bands alternately with quartz, the latter generally stained with limonite. The formation has been much twisted, folded, and contorted, probably by "end pressure," and the quartz is an "after deposition" between the laminæ. On the western summit of the river-valley is a capping of white sandstone, and on the eastern of red slate-quartz conglomerate. The river-level is far below these summits, as indicated by the respective altitudes on the following section :—

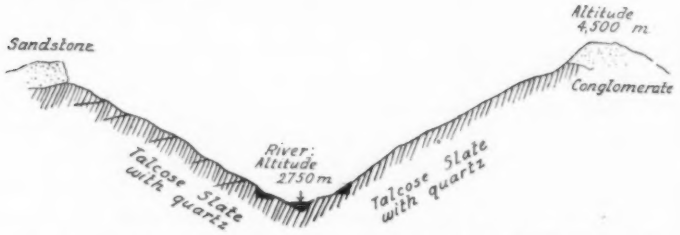


FIG. 16.—CROSS-SECTION OF THE VALLEY OF THE MARAÑON, NEAR CHUQUIBAMBA, LOOKING NORTH.

The black portions shown slightly above the river represent auriferous gravel deposits, laid down in previous epochs at a higher level.

Leaving the river, I had proceeded eastwards towards the "Montaña," arriving at the lakes of Carpa, only a few miles from the tropical region of Monzon, where there exist several factories for the production of cocaine. About 85 per cent. of the alkaloid is pure cocaine, and is extracted from the leaves of the "coca" plant or shrub, which flourishes there in abundance; altitude, 5250 feet. The lakes of Carpa are very picturesque, and of some considerable size. The altitude is 11,483 feet.

In the neighbourhood of the village of Tantamayo, about 4 leagues from Chuquibamba, are numerous old Inca ruins. In fact, all along the road from that point to the village mentioned are the remains of the fortresses of these people, crowning almost every hill. Opposite Tantamayo is a remarkable row of square towers on the summit of a hill, and as I passed they stood outlined against the evening sky, weird and romantic in their almost inaccessible abandonment. A little further on

the ruined walls and towers of a whole ancient village presented themselves to view at a turn of the road, massed on a sombre ridge on the opposite side of the valley. Above rolled the sombre night clouds; below rolled the folds of mists which arose from the Marañon, 6500 feet below—the white fleecy mist which only the mid-day sun dispels—

"Slow lingering up the hills, like living things."

Near at hand a ruined castle stands, such as might have appeared to the lonely watcher in "the valley of St. John," where Triermain hurled his axe!

In the gorge to the left hand runs the Marañon, but far below. The view is exceedingly picturesque at evening, but the writer is

FIG. 17.—REMAINS OF INCA CASTLE, NEAR TANTAMAYO (A FORTRESS ABOVE THE CLOUDS).

unable to do it justice in the hasty sketch made in passing. However, an idea may be formed of the remarkable positions in which these edifices were constructed, and the very considerable altitude at which their inhabitants dwelt. Judging from these ruins, it would seem that these people dwelt in constant fear of attack, and, in fact, it is well known that the population consisted of numerous divided tribes, who constantly made war upon each other. The ruins are nearly 16,500 feet above sea-level, and the clouds are actually both above and below them, a situation which is almost appalling. Notwithstanding their altitude, however, there is no perpetual snow in these situations, and the hill-slopes have at one time been cultivated. There is nothing which arrests the attention of the traveller in the Andes more than the peculiar aspect which these interminable slopes present, due to this anterior cultivation. At

first sight he is unable to explain the remarkable "ribbed" appearance, until he sees that it is the result of the formation of innumerable "terraces," which have previously been small plantations or fields, partly excavated on the upper and embanked on the lower side. These "antes," or "andes," as they are termed, have given rise, as is generally known, to the name by which the Cordillera of South America is designated. Moreover, the evidences of a very large anterior population is before the traveller, in that in most of these extensive regions every possible square foot of ground is so terraced, and has been at one time cultivated, however inaccessible it may appear to be. Also the very extensive ruins of habitations bear witness to a numerous people, whose customs and methods appear to have been subordinated to the rule of some absolute, yet apparently prosperous, monarch, or other individual ruler.

These extensive remains scarcely excite the notice of the present native inhabitant of the country. When questioned as to their age or purpose, he simply replies that they are "casas de los gentiles,"

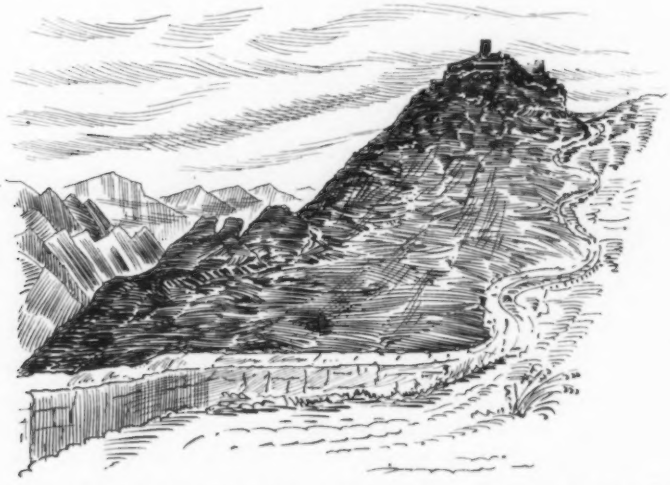


FIG. 18.—RUINED INCA FORTRESS, ROAD TO TANTAMAYO. GORGE OF THE MARAÑON ON LEFT HAND.

("houses of the gentiles"), which is the extent of his archæological knowledge. He does not even search or excavate in the hope of finding buried treasure, for superstition so bids him reverence these ancient dwelling-places that he almost fears to enter them, and fear, combined with lack of initiative, operates against any exploration.

The river is so far below that, notwithstanding the roar of its torrential passage, only the faintest murmur of its voice reaches these

"cloud-capped towers" above it, and indeed at times not even the faintest whisper breaks the solitude. Far away, until lost in the Earth's curvature, arise the summits of these endless mountains, whose succeeding peaks and ranges develop their limitless and silent geometry * before the eye. The fading day rests lingeringly upon them, tinting them in subdued colours, to where, in an indistinguishable haze, the realm of distance and of darkness renders all invisible. The night descends as I watch from where my tent is pitched, the scene is blotted out, and—

> "Like an unsubstantial pageant, faded,
> Leaves not a wrack behind."

The changes of climate are quite marked in one day's journey even in the Peruvian interior; the traveller, as has been seen from the foregoing particulars, may during the early morning be among the inclement climatic conditions of the high "puna," or uplands, whilst the afternoon sun may find him where oranges and lemons grow.

At the general altitude of 10,000 to 13,000 feet a flora very similar to that of the south of England is encountered, and I extract from my note-book—almost illegible from being written on mule-back as I journeyed along slowly, waiting for my lagging muleteers—the following notes: "It would be difficult to find a place more like Devonshire than some of these uplands. Here are the same hills and streams, the same moist, soft, cool atmosphere; the vales of mist and rushing streams of distant Dartmoor, save that these come from eternal snows above. Here are ferns and nettles, fields carpeted with buttercups in bloom, and deep in mossy bank and beneath grey stone walls are violets and stitchwort. I see no well-known furze or gorse, but the hart's-tongue fern is here, and high heads of yellow mustard are in bloom. The little plantations of potatoes might belong to a Devonshire moorland farm, and the dandelions to the border of her country roads. The 'cock's shrill clarion' sounds from the straw-thatched cottages, and cattle are browsing knee-deep in the meadows. But there is snow behind the grey quartzite blocks on either hand, from yesterday's storm upon the Cordillera, and—strange contrast!—clumps of blue lupinus raise their heavy azure heads along the edges of the field, often beneath the shadow of the mountain ash."

But there is little timber; the "quinual" and "quishaar" trees are those which principally predominate, and the eucalyptus, transplanted from Australia, is encountered in many places.

Continuing my journey, I have arrived at the town of Aguamiro, on the river Vizcana, which is a branch of the Marañon, where men and beasts halt for a few days' well-earned rest.

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* Mountain ranges seen from above present views of cones intersecting with planes and cylinders.

MOORCROFT AND HEARSEY'S VISIT TO LAKE MANSAROWAR IN 1812.

By Colonel HUGH PEARSE, D.S.O.

THE mission to Lhasa having aroused general interest in Tibet, a short account of the visit to Lake Mansarowar, by way of the Niti pass, made in the year 1812 by the traveller William Moorcroft and his less-known companion, Hyder Hearsey, may be of interest. The names and histories of both men were well known in India in their day, but Moorcroft is now chiefly remembered by the unfortunate termination of his second and last journey, while Hyder Hearsey is unknown, even to geographers, who only mention him to confuse him with his more famous cousin, General Sir John Hearsey.

Hyder Young Hearsey, born in the year 1782, was the son of Captain Harry Hearsey, an English officer in the Maratha service, who fell at the head of his cavalry regiment in the battle of Merta, in 1790. Hyder Hearsey was educated in England, and at an early age followed his father's footsteps, being appointed a cadet in the Maratha service before his seventeenth birthday, and receiving promotion, a few months later, to the rank of ensign, for good service in the field. He was kindly treated by General Perron, the French commander-in-chief of the Maratha army, but, like other Englishmen in that service, soon found his position uncomfortable, and entered the army of the celebrated George Thomas, Raja of Hansi.

In the year 1801, Thomas had become so formidable that Perron decided to crush him, and a sanguinary struggle followed, in which Hyder Hearsey bore an honourable part. When Thomas eventually fell, Hearsey, who remained faithful to him to the end, raised a force of five thousand men in Mewat and established himself as an independent chief. He married Zuhur-ul-Nissa, a princess of Cambay, adopted daughter of the Emperor Akbar II., successor of Shah Alam; he owned large properties, and was in a position of no small importance.

On the breaking out of the war between the British and the Maratha confederation in 1803, Hyder Hearsey at once declared in favour of his countrymen, and was severely wounded in a minor operation in the early part of the war. In accordance with Lord Wellesley's proclamation, calling on all English subjects to assist in the war, Hearsey disbanded his own troops, except one cavalry regiment, which he was permitted to bring in and command. With this regiment, he served in the relief of Delhi and the battle of Deig, and subsequently did good service until the end of the war in 1806.

In 1808 Hearsey accompanied Lieuts. Webb and Raper in an expedition to trace the source of the Ganges, and in the following year he was actively employed in expelling a party of Gurkhas who had

taken possession of part of the Oudh Terai. This service was achieved with success, but the incursion of the Gurkhas was one of the aggressions which eventually led to the war with Nepal in 1815. In this war Hyder Hearsey took a prominent part. There is ample evidence in the Parliamentary Papers connected with the war that he was much consulted by Lord Moira's Government; and, in consequence of the ill success which attended our early operations, he and his brother-in-law, William Linnæus Gardiner, who had married another of the princesses of Cambay, were employed to conduct an independent expedition against the province of Kumaon. This operation was eminently successful, but Hyder Hearsey himself was very severely wounded and taken prisoner, his life being saved by the intervention of a Gurkha chief, whose friendship he had made during his expedition to Lake Mansarowar. Hearsey died in 1840.

In the year 1812, Hyder Hearsey, who was living on his property near Bareilly, undertook the exploration of Western Tibet with his friend, William Moorcroft. The latter was a native of Lancashire, who had been educated as a surgeon, but had been persuaded by the celebrated John Hunter to turn his attention to veterinary surgery, a science then much neglected in England. Moorcroft completed his studies in France, and, after making a considerable fortune by the practice of his profession in London, most of which he lost by an unfortunate investment, he accepted an offer from the Court of Directors of the East India Company to go out to Bengal as superintendent of their military stud. He went to India early in the year 1808, and soon formed the conviction that the native breed of horses in India, then of poor quality, could best be improved by an infusion of the blood and bone of the Turkoman horse of central Asia. Mr. Moorcroft, who was a man of many interests, also desired to be instrumental in promoting commerce between India and the neighbouring countries, and he was also desirous of serving his country as a geographer.

To such a man the friendship of Hyder Hearsey was no mean acquisition, and it was undoubtedly thanks to Hearsey's tact, knowledge of native manners and customs, and widespread influence, that the two travellers achieved their remarkable exploration of Western Tibet and returned safely to India.

A summary of Mr. Moorcroft's account of his journey, in company with Hyder Hearsey, to the sacred Lake Mansarowar, is to be found in vol. 12 of that rare publication 'Asiatick Researches,'* published at the *Calcutta Gazette* Office in the year 1816. The summary was made by Mr. H. T. Colebrooke, the President of the Asiatic Society (to use the modern spelling), and certain details of general interest, omitted by Mr. Colebrooke from considerations of space, are still extant in

* The earliest series of *Transactions of the Asiatic Society of Bengal* commenced in 1788.

Hyder Hearsey's notes on his journey, and will be found in the following pages.

Mr. Colebrooke, an acknowledged authority of the period on Indian exploration, states in his introductory remarks that the journey to Tibet was "undertaken from motives of public zeal, to open to Great Britain means of obtaining the materials of the finest woollen fabric. The arduous and perilous enterprise in which Mr. Moorcroft, accompanied by Captain Hearsey, engaged, and which was prosecuted by them with indefatigable perseverance and admirable intrepidity, undismayed by the difficulties of the way and the dangers with which the jealousy of the Nepalese beset them on their return, and undeterred by hardships and privations, and in Mr. Moorcroft's instance by frequent illness, has in the result not only accomplished the primary object which was in view, but has brought an interesting accession of knowledge of a never before explored region; and has ascertained the existence, and approximately determined the situation of Manasarovara, verifying at the same time the fact that it gives origin neither to the Ganges nor to any other of the rivers reputed to flow from it. Mr. Moorcroft . . . found reason to believe that the lake has no outlet. His stay, however, was too short to allow of his making a complete circuit of it: and adverting to the difficulty of conceiving the evaporation of the lake's surface in so cold a climate to be equivalent to the influx of water in the season of thaw from the surrounding mountains, it may be conjectured that, although no river ran from it, nor any outlet appear at the level at which it was seen by Mr. Moorcroft, it may have some drain of its superfluous waters, when more swollen and at its greatest elevation, and may then, perhaps, communicate with Rowan lake, in which the Sutlej takes its source, conformable with the oral information received by our travellers."

Returning to Hyder Hearsey's notes of the journey, we find that the travellers crossed the British frontier of Rohilkhand and entered Kumaon, then occupied by the Gurkhas, on May 9, 1812, disguised as Gosains, or Hindu pilgrims. They were accompanied by no less than fifty-two natives — mostly hill coolies, no doubt, but including an Afghan soldier of fortune named Gholam Hyder Khan,* who had long been attached to Hyder Hearsey, and two pundits, or educated natives, who had been engaged as surveyors.

Moorcroft states that Hearsey undertook the survey of the entire route traversed, and that Harkh Dev, one of the pundits, paced the road; two of his ordinary steps measuring exactly 4 feet.

From May 9 to 24 the travellers went over ground that had already been explored by Colonel Colebrook; but on the latter date they left

* Gholam Hyder Khan afterwards accompanied Moorcroft on his ill-fated expedition to Bokhara, and was the only member of it who returned to India.

the Badrinath road at Joshimath, and thence travelled over unexplored ground to the village of Niti, which they reached on June 4. At this point the Tibetan authorities began to make difficulties about further progress, pointing out "that this was a road by which pilgrims to Mansarowar seldom came; that we were armed; that we had many people; that report said that we were either Gorkhalis or Firingis come with designs inimical to the Undes; and that measures had been taken accordingly." (Undes, or Hundes, was the name applied to Tibet by the travellers.) The disguise as Gosains had, then, not been altogether successful, as might have been anticipated; and nothing but the great tact, patience, and courage shown by the travellers enabled them to complete their journey to the sacred lake. The Tibetans have from time immemorial shown the greatest aversion to any visits by Europeans from India, while the hill states of Kumaon and Garwhal were at this time in the hands of the Nepalese, whose policy was most hostile to the English. The Gurkha war, which broke out two years later, was in fact already brewing. Moorcroft and Hearsey explained to the headman of Niti that "for pious and humane reasons we wished to visit the Lake of Mansarowar; that for defraying our expenses we had brought certain articles from our country for sale; that we had for our own defence certain arms which we were willing to leave in his keeping during our stay in the Undes."

This declaration seemed to give satisfaction, but the travellers were requested to await for a period of fifteen days, until the reply of the Tibetan rulers of that province could be received.

After many days of fruitless and wearisome negotiations, it at length became clear that the delay was entirely caused by the headmen of the Niti villages themselves, the authorities on the Tibetan side of the pass having no means of stopping the travellers if the Niti headmen chose to introduce them to their northern neighbours. The sacrifice of a bottle of brandy, made into punch and well sweetened, was not without effect in a heated debate which took place on June 23; but the ascent of the pass did not finally take place until the last day of the month.

Travelling slowly and gradually establishing friendly relations with the chiefs and priests of the province, Moorcroft and Hearsey reached the town of Daba (some 20 miles over the border) on July 3. They had experienced considerable difficulty in traversing the Niti pass, the road being of the roughest description.

They describe Daba as "perched upon the top of a rock which juts out towards the river with an irregular declivity, and is surmounted by the highest eminence in the whole line which defends it from the north-west." They add that at Daba they found a few cultivated fields, which were the first that they had found in Tibet. The river referred to is the Tiltil, a tributary of the Sutlej.

There were three persons of importance at Daba, styled by Moorcroft the Lama, the Wazir, and the Deba, or head zemindar.* The wazir was absent on business towards Mansarowar, and his son represented him. Hyder Hearsey's notes, which are more plain spoken than Mr. Moorcroft's narrative, run as follows:—

"After breakfast this day (July 4) Umar Singh sent word to us to come and pay our respects to the wazir's son, in council assembled with the lama and the son of the deba. We proceeded about nine o'clock attended by the pundit and three or four other servants, carrying the presents for these people. The presents consisted of 3 yards of superfine scarlet broadcloth, some sugar and spice, all arranged on a brass plate. We first entered a gate, over against which was fastened a very large and handsome dog, something of the Newfoundland breed; the entrance stunk very much of him.

"We then had to stoop to enter another door—filthy enough, stench abominable. We then proceeded up a few steps of earth and stones, all broken. We turned to the right and entered a small antechamber, to the right of which was the women's room. A greasy, filthy purdah was then lifted up, and we entered the parlour. Here we found a clean mirzai, or poor woollen carpet, spread for us in the centre of the room. In front was a vacant seat, opposite to which our presents were placed. On the right sat the lama on a cushion; before him was placed a kind of tea-poy (three-legged table), on which were two wooden varnished plates, painted and gilt. There was also a fire-pan. The old gentleman appeared about seventy years old, had a shrewd countenance, said very little, and eyed us all the time. He was dressed in a coarse, woollen, red garment, the manufacture of the country, greasy and dirty in the extreme. This was the bishop of this see.

"He had another priest sitting to his right, more black, more filthy, and more ugly than himself. Opposite to me sat the son of the deba, a dark but sensible, though rather heavy-looking person, aged about twenty-nine or thirty. He had a paper in his hand at our entrance, as if in the act of writing. He was seated on a leather cushion stuffed with wool, over which was a carpet; before him was a sort of small table, on which were two of the wooden plates before mentioned, a china cup, an inkstand, a wooden pen, and a knife. To his right lay a long silver pipe. He was dressed in a red, blue, green, and yellow striped woollen gown."

It appeared that the paper was a letter to the commander of Gortope (or Gartok), a neighbouring seat of government, explaining that Moorcroft and Hearsey really were harmless pilgrims, and not the dreaded Firingis, and requesting that they might be permitted to

* It appears that the terms "wazir" and "deba" were incorrectly used, the former not being a Tibetan word, while *deba* is merely a respectful suffix.

proceed to Lake Mansarowar. Suspicions were again aroused on the following day by the discovery that Hearsey wore half-boots of an English pattern, a curious slip on his part, which his fellow-traveller records with obvious relish, adding that he himself had taken the precaution of having turned-up toes added to his own shoes.

On July 8 an answer to the deba's letter was received from Gortope, which was conveyed to the travellers on the following day. It was to the effect that the governor had been informed three years previously that some Europeans were about to come into the country. He therefore desired to see the travellers.

Messrs. Moorcroft and Hearsey accordingly set out from Daba on July 12, and, after a six days' march, reached Gortope, which they found to be a large encampment of blanket tents in clusters. The deba, however, had a small house, surrounded by a fence about 4 feet high, and to this residence the travellers were at once summoned. The interview was a long one, and the council, similarly composed to that at Daba, was at first distrustful, but the travellers were at length enabled to allay all suspicion as to their being Europeans.

On the following day, July 18, trade relations were established, and the Kashmirian vakil, or agent, of the Raja of Ladak, who was at Gortope, expressed a desire to open a commerce with Hindustan.

By July 22 Mr. Moorcroft was on friendly terms with the "deba," who, when asked what articles he would like brought up for him from India, said that "a sword and a necklace of large pearls of a rose-colour, pear-shape, and free from flaws or irregularities, would be most acceptable." Evidently an enlightened man, the deba, and a shrewd man of business too, for Mr. Moorcroft adds that he gave a sketch of the necklace which he desired, worth probably about two thousand rupees, but the cost of which the deba estimated at three or four hundred. The deba then gave the travellers leave to visit Mansarowar, but ordered them to confine themselves strictly to the usual pilgrim road, and to return by the Niti pass.

It is worth mentioning that Hearsey was informed by the vakil of the Raja of Ladak that the *Ooroos*, or Russians, had long been in the habit of trading with that country, and had, in the last three years, pushed a lively trade into Kashmir by means of agents. The *Ooroos* had not yet visited Ladak in person, but the Deba of Daba asserted that caravans of five or six hundred of them, on horseback, had come to the fair of Gortope. In a later conversation the Ladak vakil said that a few Russians had been in Kashmir.

The travellers left Gortope on July 23, and on August 2 arrived at "the Lake of Rawanhrad, a large sheet of remarkably blue water, said . . . to communicate by a river with the lake Mansarowar." On August 5 they came in view of the holy lake, and on the following day halted on its bank. The travellers remained for two days, exploring

the shores of the lake. Mr. Moorcroft describes Mansarowar in the following terms: "In form it appeared to me oblong, the sides of the east, west, and south nearly straight; that of the north, and especially to the north-east, where there is a plain at the foot of elevated land, indented and irregularly tending to the east. The angles were not sharp, or its figure would have approached nearer to a square than to any other, but it may be considered as an irregular oval. Its breadth from south to north I estimate at about 11 miles, its length about 15. The water, except where disturbed by the wind near the beach, where it is sandy, is clear and well tasted. No weeds are observable on its surface, but grass is thrown upon its banks from the bottom. The middle and sides farthest from the spectator reflect green, and, taken altogether, it has a noble appearance, whether in an agitated or a quiet state." Mr. Moorcroft discovered a number of caves, inhabited by religious recluses, and mentions that one of the nuns, struck by pity, no doubt, at his haggard and worn appearance, offered him hospitality, but "with the most cordial salutation and expression of thanks by dumb show," he took his leave and went on with his survey. Mr. Hearsey, meanwhile, cut Moorcroft's name and his own on a stone, and left it in a secure place, an excusable act under the circumstances.

The return journey was begun on August 8, and on the 22nd the party again reached Daba, where the children received them as old friends. The travellers had some difficulty in obtaining transport to carry them back over the mountains, but eventually left Daba on August 26, and by September 3, after an arduous journey, were delighted to see trees once again. Their worst troubles were, however, to come, for after an interesting march through the hill country, during which they resumed their European dress, the travellers were arrested by the Gurkha rulers of Kumaon.

On October 9, Banda Thapa, a chief who had communicated by letter with the travellers four days previously, met them by appointment at Chandpur. Banda Thapa, "a stout old man of seventy, and altogether not superior in his appearance to one of the zemindars of Ghazipur," * inquired why Messrs. Moorcroft and Hearsey were travelling through Gurkha territory, and particularly why they had disguised themselves. The travellers replied that it was the custom for travellers to disguise themselves, and that by no other means could they have entered Tibet. They asked if any complaint had been made as to their conduct, and, on receiving satisfactory assurance on that head, pointed out that hundreds of Nepalese were allowed to travel at their pleasure through the Company's territories.

Banda Thapa took his leave, apparently satisfied, but on October 15

* Moorcroft's residence in India.

the travellers were finally arrested, and placed under a military guard. They were informed that the local authorities were in consultation as to what should be done with them, and it transpired later that their arrest was in fact ordered by letter from Khatmandu, the Nepalese capital. Mr. Moorcroft, who was armed at the moment of arrest, was treated with great violence, and his arms were pinioned. Hearsey was held by several men, but not bound. The pundits and other followers of the party were shackled to wooden blocks. Mr. Moorcroft acted with great courage and firmness, and after a time secured his own release and that of his servants.

Hyder Hearsey writes with great indignation of the manner in which he and Mr. Moorcroft were treated, but as the Gurkhas had been ordered by their rulers to arrest the party, who obviously declined to stop when requested to do so, it is hard to see how violence could have been altogether avoided. After various communications with Bam Sah, the Gurkha governor of the Almora district, and Amar Singh, the commander-in-chief of the Gurkha army, Moorcroft and Hearsey were released on November 1. The Pundits, however, still remained in irons until November 5, when a letter arrived from the Maharaja of Nepal, directing that the whole party should be set at liberty and escorted into British territory.

So ended this adventurous journey, the first occasion on which English travellers from India traversed the Himalaya mountains into Western Tibet, and visited the sacred lake of Mansarowar, the great plain between the Himalayas and the Kuen-lun mountains, and the upper waters of the river Sutlej.

NOTES ON A JOURNEY THROUGH THE NORTHERN PENINSULA OF NEWFOUNDLAND.

By H. C. THOMSON.

In spite of the fact that the railway now goes right across Newfoundland, the interior is still comparatively little known, more especially that portion of it extending from Bonne bay to Cape Norman, forming part of the French shore, and commonly known as Le Petit Nord. Before long it will be traversed from end to end in the search for the mineral wealth it is believed to contain, for the country itself is an easy one to travel in. Last summer a friend, Mr. W. H. Burt, and myself spent six weeks in wandering through it, and these notes may be of assistance to those who wish to undertake a similar journey.

Sir Robert Bond, the Premier, very kindly gave us letters of introduction to different people along the coast, and also to Mr. J. P. Howley, F.G.S., the Director of the Geological Survey, who knows more

of the interior than any one in Newfoundland. To him we are indebted for much kindness, and for a great deal of invaluable information.

By the advice of Mr. Howley, we arranged with Matthieu Michel, a Mic-mac trapper, more generally called Mattie Mitchell, the only man who has ever made a connected journey from one end of the northern peninsula to the other, to go with us as guide. He took with him his son, a boy of sixteen, and Reuben Smith, another reliable Bonne bay guide.

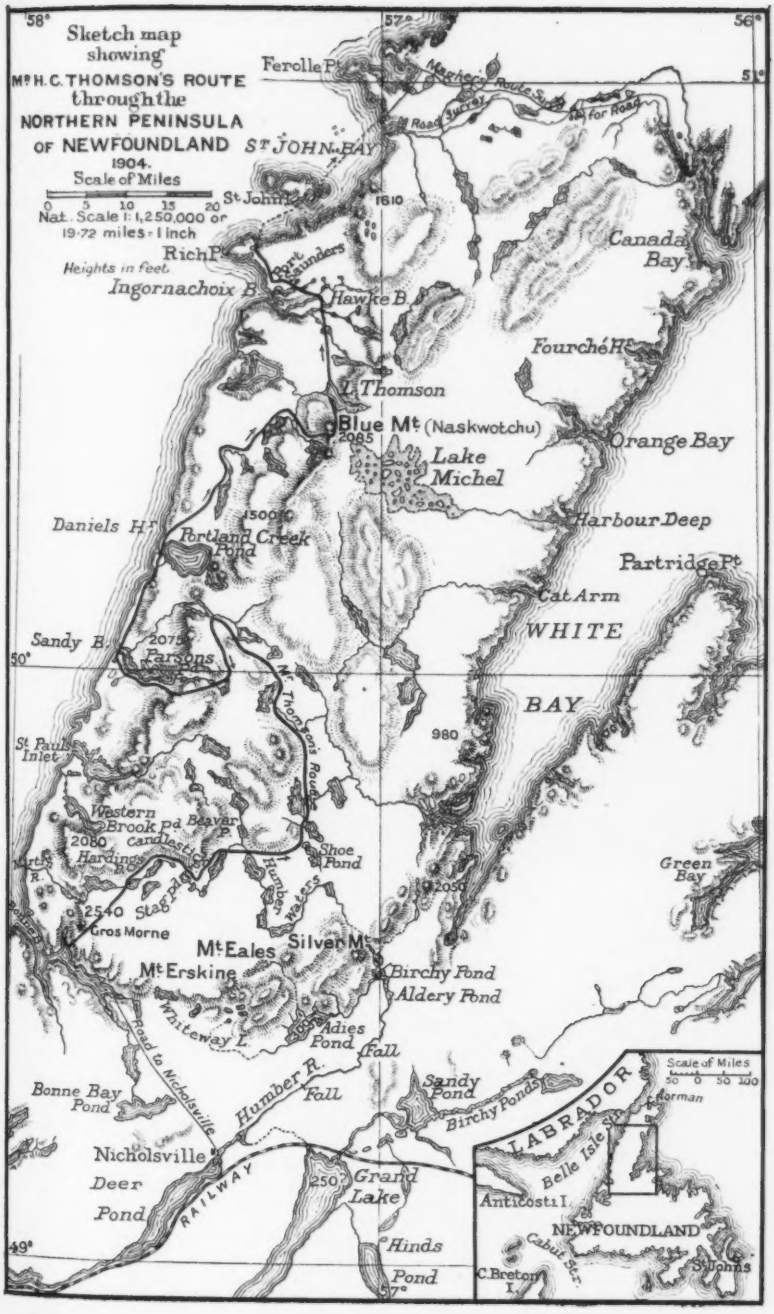
Everything had to be carried on our own backs; so we took nothing that was not absolutely needful, every pound being a matter of consequence. We left Bonne bay on August 29, and ascended to the high plateau that lies to the north of the bay by a landslide, or "scrape," to use the local expression, of over 1000 feet in height, of exceedingly slippery blue slate, on which it was difficult to obtain a foothold.

The weather was clear and warm. The summer had been an exceptionally hot one, many days over 90° in the shade, and although the approach of autumn was already beginning to make itself felt, the lowlands were carpeted with flowers and with a profusion of berries.

On August 31 we crossed the watershed. We could see south as far as the Topsails, the hills over which the railway passes on its way to the Grand pond; whilst to the north-east there lay before us a long succession of small lakes, or ponds, as they are called in Newfoundland. The first of these the men knew as the Stag pond. Its sides were covered with the blue flag, and with a species of lily called the beaver root, constituting the chief food of the beaver, which the Indians say is good for consumption. Michel told us that in the Stag pond one of the branches of the Humber rises.

On September 1 and 2 our course took us over broken ground, ridge after ridge of low hills, with intervening lakes. Up to this point we had met with nothing but hard granite and syenite, with no sign of mineral in it.

On September 3 we crossed the Humber, the northern branch of the river. In the old maps it is depicted flowing in an almost straight line from a big lake at the back of Doctor's Hill, a considerable way to the north of Hawke's bay. The existence of this lake was based mainly on conjecture, and in the more recent maps it was left out altogether, the source of the Humber being taken to be Adie's pond. Prof. Jukes, writing in 1840, mentions, however, that the Indians said that "the Humber flows from two large ponds on the eastern flank of the long range, about in the latitude, or as they expressed it, at the back of Cow's Head." This, Michel said, was actually the case, that there are really three sources—one in Adie's pond; one in Stag pond, where we had already met with it; and the one we were then crossing, which rises in a pond at the back of Cow's Head. There is, as a matter of fact, a large lake in the interior, which Michel had once visited, but it


Sketch map showing
Mr H. C. THOMSON'S ROUTE
through the
NORTHERN PENINSULA
OF NEWFOUNDLAND
1904.
Scale of Miles
0 5 10 15 20
Nat. Scale 1:1,250,000 or
19·72 miles = 1 inch
Heights in feet
St. John's
Ferolle Pt
ST JOHN'S BAY
Rich Pt
Port Saunders
Ingornachoix B.
Hawke B.
L. Thomson
Blue Mt (Naskwotchu)
2085
Lake Michel
Daniels Hr
Portland Creek Pond
Sandy B.
Parsons
St Pauls Inlet
Western Brook Pd
Beaver R.
Candlestick
Harding's R.
Shoe Pond
Gros Morne
2540
Mt Eales
Silver Mt
Mt Erskine
Whiteway L.
Road to Nicholsville
Adies Pond
Fall
Humber R.
Bonne Bay Pond
Nicholsville
Deer Pond
RAILWAY
Grand Lake
Hinds Pond
Birchy Pond
Aldery Pond
Sandy Pond
Birchy Ponds
Fourché Hr
Canada Bay
Orange Bay
Harbour Deep
Partridge Pt
Cat Arm
WHITE BAY
Green Bay
LABRADOR
Scale of Miles
Norman
Belle Isle Str.
Anticosti I.
NEWFOUNDLAND
Cabot Str.
C. Breton I.
St Johns
58°
57°
56°
51°
50°
49°

lies a good deal to the south of where it was placed on the old maps, and is where I have placed it on the accompanying map. The Humber is not connected with it in any way, but it drains into either Cat Arm or Harbour Deep; Michel is not sure which, but he thinks into Harbour Deep. He canoed all round it, and called it the Lake of Three Hundred Islands, from the immense number of small islands with which it is studded. He calculated that it is rather over 20 miles in length, and from 10 to 15 miles in width. Our march after this took us over thickly wooded hills to the Sop's Arm river, the wood being almost entirely fir, rather stunted, with hardly any spruce or birch. Very few

LAKE ON THE WEST SIDE OF THE BLUE MOUNTAIN.

of the lakes of this high plateau contain fish; either the water is too cold, or the streams issuing from them have high falls up which the salmon are not able to pass.

On September 4 we altered our course for Parson's pond, not having time to go on to the Sop's Arm Steady, as we intended. The morning was misty, we could hardly see 20 yards ahead of us, and the walking was difficult, the toil of forcing a way through the thick undergrowth being very great. We rose gradually to a broad, fairly even barren, with here and there a curious saddle-backed outcrop of granite, generally from about 100 to 200 feet in length and 50 feet in width at the base, terminating at the top in a sharp ridge—a curious formation for which we were unable to account. There was evidently much iron about, for the compasses swung a good deal.

On September 5 our course took us over a rocky, moss-covered barren, fairly dry, and with comparatively little bog, and about mid-day we came to the end of the gorge which lies at the back of the upper Parson's pond. It is a deep-cleft ravine with cliffs nearly 2000 feet in height, rising almost sheer, and approaching to within a few hundred yards of each other. Between them winds a long sinuous lake which entirely fills up the gorge, so that the only way through it would be by making a raft. Beyond the lake we could see a low strip of green marshland, and beyond that the azure sea. The atmosphere was of that extraordinary clearness which one so often finds in mountains after rain. The hills were cleft by ravines at short intervals, forming flat-topped

LONG RANGE AT THE BACK OF PARSON'S POND.

barrens with abrupt sides, giving them, from the sea, the appearance of gigantic barns; that, doubtless, as Archbishop Howley pointed out to me, being the origin of the French name "La Grange" of this mountain chain, of which the English "Long Range" is probably a corruption.

The sides of the gorge were too steep to be attempted with our heavy loads, and the timber, seen through our glasses, looked too small to make a raft with of sufficient strength to risk ourselves upon it on the lake, as the wind blows like a hurricane through these funnel-shaped openings between the hills. There was nothing for it but to hark back along the crest of the Long Range to try and find an easier descent.

On the 6th, after a stiff climb up and down rocky ridges, we came

on a small ring-shaped pond into which a good-sized brook flowed, but to which there was no apparent outlet. High cliffs on both sides rose almost perpendicularly, and at the other end of the pond we came on a narrow valley shut in by hills on three sides. We clambered down by a dry rocky watercourse, and after a couple of hundred feet of descent came upon a fairly large stream issuing by an underground outlet from the lake above. We found here a few traces of copper and a little pyrrhotite. In the wood at the bottom of the valley the flies, which had not troubled us at all on the uplands, were exceedingly bad, both black flies and mosquitoes. In places the scrub was so thick that we had to cut our way through it with the axes, and finally had to wade down the stream in icy cold water for a couple of miles to a chain of little lakes with a strip of level land between them and the hills, covered with a thick growth of stunted spruce and juniper—"tucking bushes" as they are called in Newfoundland—which, in our tired state, proved more difficult to walk upon than anything we had yet experienced. The branches interlace like a creeper, but are not strong enough to bear a man's weight, and the labour of wading through them, encumbered with a heavy load, is extreme.

On the 7th we came to bigger timber, spruce and birch intermingled with the fir, and a rapid descent by a trapper's path brought us out on the extreme end of Parson's pond, on a soft piece of swampy ground. We edged along the pond to the camp of the Newfoundland Petroleum Company, where Mr. Powell, the manager, kindly put us up. The company has three boreholes on different sides of the pond, each over 2000 feet in depth. The oil is of good quality, but as yet the supply is scanty. The rocks here are stratified rocks, mostly sandstones and limestones, belonging to one of the older geological formations.

On September 8 an exceedingly trying march over boggy ground, into which we sank over our knees in the soft spongy moss, making walking excessively laborious, took us out to Sandy bay at the mouth of the river, where we put up in a comfortable little fisherman's boarding-house. Unfortunately, there were no sealskin boots to be had, nor were we able to get any until we arrived in Port Saunders. They are quite indispensable for a journey of this kind.

From Sandy bay we followed the Government road along the seashore as far as the Portland Creek river, where we camped. A French sailor, Alain Ofry, who has settled here, said the soil in places was excellent, as good as any he had seen in his native Brittany. Potatoes, cabbages, and turnips all do well. He has a large garden, eleven sheep, and several cows. There is plenty of pasturage for the cattle, and an abundance of hay. The soil, it is true, is boggy, but there is a strip, which he took me to see, running along the coast from half a mile to a mile in width, which consists of a dry peaty soil with a clay subsoil of altogether about 5 feet in depth, on which he said almost anything

STAG POND.

would grow. He told us he had no trouble whatever with the sheep, except from the dogs. He only had a few, but he thought there would be no difficulty in keeping any quantity that might be desired.

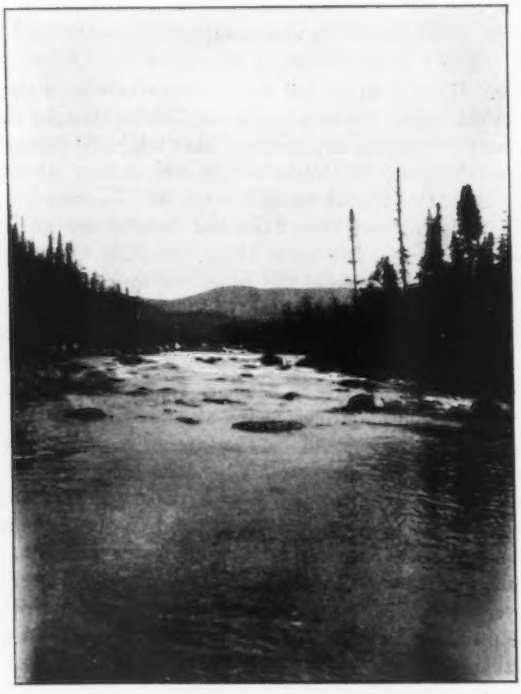
The general view in St. Johns is that the country is quite impracticable for sheep, the ground being too wet and barren; but, so far as I was able to learn, both liver-fluke and foot-rot are unknown, and the few sheep that are now kept along the west coast, which is by far the most promising side of the island for sheep, do well, and have no difficulty in getting through the winter, and the exposure makes them grow a remarkably fine and full fleece, the wool fetching a high price. Whether sheep-raising could ever be rendered profitable on a large scale can, however, only be demonstrated by one or two attempts made by practical sheep-farmers with a sufficiently large capital to ensure a fair trial. If it could be, the market both in Great Britain and in America would be a near and a lucrative one.

It is curious that the original settlers took a much more hopeful view of the question than the present generation of Newfoundlanders, whose attention is devoted almost entirely to the fisheries. Captain Hayes, whom I will again quote, said, "the grasse and herbe doth fat sheepe in very short space, proved by English merchants, which have carried sheep thither for fresh victuall, and had them raised exceeding fat in less than three weekes."

There most certainly is no want of pools, and the constant rain and the great extent of bog land have given rise to the opinion that sheep could

not possibly thrive. At the present time there are not 100,000 in the whole island (at the last census there were 78,000), although it is a third larger than Ireland. But in Finland, in which the proportion of water and swamp is even greater, comprising 32 per cent. of the whole, and where the rock formation is of a very similar nature, the number of sheep—according to the *Times* Encyclopædia—at the last census was found to be no less than 1,092,420, whilst in Norway there were 1,417,500, and in Sweden 1,261,493.

On September 12, from Portland creek we went 4 miles further along the coast to Daniel's harbour, and thence made our way again inland over the same kind of country, marshes and lakes in the low ground (which is there of much greater extent) lying between the hills and the sea. In places we came upon fairly good timber, and immediately under the hills we found a series of long and deep lakes, one of which we had to cross by means of a raft. On the other side we found ourselves immediately beneath the Blue mountain, the Mic-mac name for which, Michel told us, is Naskwotchu, or Blue hill.



NORTHERN BRANCH OF HUMBER RIVER.

Our course took us right across it, but unfortunately the day was wet and misty, and we could see but little of the surrounding country, though Michel pointed out the position of the great island-covered lake which he had once visited, and to which his name has since been given by Mr. Howley. In the glimpses of sunshine we could see almost as far as Canada bay, following the north-easterly trend of the Long range, the granitic backbone of the peninsula.

On the other side of the mountain we travelled through some remarkably fine timber to another and even larger lake, where we again had to build a raft. It took us a day and a half to get round to the other side, as there was a nasty lop on the lake which sent the

GORGE AT BACK OF PARSON'S POND.

water right over the raft and delayed us considerably. I should mention that the honour of giving my name to this lake has been conferred on me. From the other side we made our way to Hawke's bay through fairly level and heavily timbered land.

It took us altogether ten days of hard marching to get from Daniel's harbour to Hawke's bay, and for the last four days we only had half a pound of flour a day each, with tea and a little sugar.

The unbroken silence was profoundly impressive, with the absence both of animal and of bird life. There were, no doubt, great numbers of caribou, for we saw their tracks everywhere; but we never heard them and hardly ever saw them. Prof. Jukes had a similar experience,

"Notwithstanding," he says, "the abundance of deer in many places I visited, I was never lucky enough to see one alive, nor have I seen more than one recently killed." Michel said the deer were, if anything, increasing in number. Nor did we come across any bears, which are still common in some parts of the island. Beavers are practically extinct, and so are wolves, whose place has been taken of late years by the lynx, which is said to have made its way over from Labrador, for it was formerly unknown. As yet the wolverine, or carcajou, so much dreaded by the Indians in Labrador, has not made its appearance. The Canadian hare, which in Newfoundland is called the rabbit, was very scarce, a disease having almost exterminated it during the preceding two years. Bird life also was scanty: we saw no curlew, which are said to have been formerly so plentiful; only a few snipe and twillick, and here and there a few ptarmigan and willow grouse, and an occasional duck or fish-hawk or loon. The only exception was the ubiquitous jay, the *Corvus Canadensis*, two or three of them never failing to visit our camp in quest of food; and at night we used sometimes to hear the hooting of an owl. The absence of reptile life was even more remarkable; not a snake, or lizard, or frog, or toad. None had ever been seen in the island, until some frogs were imported by a Canadian enthusiast and turned loose near St. John's a year or two ago.

From Hawke's bay it was a day's march to Port Saunders, where we were at last able to get sealskin boots, the want of which had made the last few days exceedingly trying. As it was, we were able to complete our journey to Flower's cove on the Straits of Belle Isle in comparative comfort. From Hawke's bay the land slopes gradually down, until in the extreme north it becomes flat and low, not more than 100 feet above the sea-level, and the formation changes from granite and quartzite to a compact cherty limestone with an almost horizontal stratification.

At Port-au-Choix we were kindly received by Captain Laurent, who put us up, and sent us across the following day in one of his schooners to Bartlett's harbour, on the other side of St. John's bay, thereby saving us a troublesome march of about 30 miles. The obstacle of the French treaty rights, which stood in the way for so long of the development of this coast, has now been happily settled by the Anglo-French Convention, and there is no reason why the French shore should not now be profitably worked, as regards both mines and agriculture, as well as the fisheries, if it be found that such development is practicable.

And although the climate is a hard one—the winter long, and the summer all too short, there is no reason to despair of the success of agriculture even in the northern peninsula, which the Arctic current, setting through the Straits of Belle Isle, has rendered less fit for

cultivation than the rest of the island. The conditions are not worse there than in Finland and Lapland, where the majority of the population depend mainly upon the land, and not upon the fisheries, and where, although wheat cannot be raised any more than it can in the greater part of Newfoundland, they nevertheless make a subsistence from oats and rye, potatoes and beetroot, all of which do admirably in Newfoundland, although hardly any of the fishermen take the trouble to grow them.

At Flower's cove we took the steamer back to Bonne bay, and from there walked over to the railway at Deer lake, which we reached on October 15, thus ending an enjoyable and interesting journey. On

LAKE ON EASTERN SIDE OF THE BLUE MOUNTAIN.

arriving at St. John, I handed the rough sketch-maps of our course, which I had made with the assistance of Michel, to Mr. Howley, who very kindly reduced them to scale, and laid them down on an Admiralty chart of the northern peninsula. On returning them to me, he wrote, "While, of course, it cannot lay claim to any such accuracy as an actual instrumental survey, it nevertheless affords sufficient evidence of approximate reality as to warrant my inserting it (provisionally) on our general map of the island.

"I have little doubt that the main topographical features, as depicted by you with the assistance of your Mic-mac guide, Mattie Michel, are correct. I know these Indians well enough to be aware of their acute powers of observation, of which I have frequently availed myself in mapping out portions of the interior."

The Mic-macs came over from Cape Breton in 1782, after the war with America, when they were given a grant of land in Bay St. George. They are nearly all gone now, Michel being one of the few remaining. A fierce feud existed between them and the Beothuks, the aborigines, for whose extermination they were even more responsible than the settlers—an extermination that is to be in every way regretted. They would have been invaluable in the development of the island, for the early colonists speak of them as friendly and tractable, quick in apprehension, and of an ingenious and subtle disposition; and the interior, instead of being the desolate wilderness it now is, might have been filled with flocks and herds. With their knowledge of woodcraft, they might, and probably would, have taken in Newfoundland the place of the Forest Laps in Lapland.

DIMENSIONS OF THE NILE AND ITS BASIN.

By Captain H. G. LYONS.

The length of the Nile is usually given * as 5400 kilometres (3355 stat. miles) to the centre of Lake Victoria, or 6000 kilometres (3728 stat. miles) for the continuous waterway from the source of the Kagera to the sea; the area of its basin is given as about 2,900,000 square kilometres (1,119,737 square miles). These measurements have hitherto been made on small-scale maps, but since a considerable part of the upper Nile has been recently surveyed on 1 : 250,000 or a larger scale, and numerous points in its course have been fixed astronomically and by triangulation, it is now possible to measure its length sufficiently accurately to furnish a value which later surveys probably will not materially alter.

In the opposite table the results of such a measurement are set forth together with the maps used. The measurements were made with the curvimeter,† and the mean of four concordant readings were taken. The centre line of the river was followed as far as possible, and round islands the wider arm. The measurements were made in kilometres, and were corrected for instrumental errors and map shrinkage.

The distances below Wadi Halfa are those generally accepted.‡ A new triangulation has just been completed from Damietta to Wadi Halfa, and the publication of a general map of the Nile valley and delta on the scale of 1 : 50,000, based on the Revenue Survey maps of 1 : 2500 and 1 : 4000, will be commenced forthwith; as soon as these map sheets are ready, improved values for this distance will be

* Wagner, 'Lehrbuch der Geographie,' p. 417. Hanover: 1903.

† By Coradi, of Zürich.

‡ Willcocks, 'The Nile in 1904,' Tables vii., viii. London: 1905.

TABLE OF DISTANCES ON THE RIVER NILE.

	Place.	Distance.		From Ripon falls.		Authority.	Scale.
		Km.	Miles.	Km.	Miles.		
Victoria Nile.	Ripon falls	—	—	—	—	Intell. Dept. W.O., Map No. 1429.	1 / 633600
	Kakoji	64	40	64	40		
	Mruli	135	84	199	124	Survey by Captain R. Owen. Cf. *Geogr. Jour.*, March, 1905.	1 / 190080
	Foweira	75	47	274	170		
	Murchison falls ...	77	48	351	218		
	Albert lake	38	24	389	242	Colonel Delmé-Radcliffe, *Geographical Journal*, Feb. 1903.	1 / 500000
Bahr el Jebel.	Bahr el Jebel entrance	3	2	392	244		
	Wadelai	64	40	456	283		
	Nimule	152	94	608	378	Sir W. Garstin, 1903.	1 / 1000000
	Asua river	21	13	629	391		
	Fort Berkeley ...	126	78	755	469		
	Gondokoro	32	20	787	489		
	Lado	12	7	799	496	Captain H. G. Lyons, 1901 and 1903, adjusted to positions determined by Colonel Hon. M. G. Talbot, R.E.	1 / 80000
	Mongalla	29	18	828	515		
	Bor	134	83	962	598		
	Kenisa	117	73	1079	670		
	Ghaba Shambé ...	80	50	1159	720		
	Hellet Nuer	181	112	1340	833		
White Nile.	Lake No	208	129	1548	962		
	Taufikia	132	82	1680	1044		
	Dueim	630	391	2310	1435		
	Khartum	200	124	2510	1560		
	Shendi	186	116	2696	1675		
	Atbara river	139	86	2835	1762	Topographical Division, General Staff. Map of Africa.	1 / 2500000
	Berber	40	25	2875	1786		
	Abu Hamed	208	129	3083	1916		
	Merowe	240	149	3323	2065		
	Dongola	272	169	3595	2234		
	Wadi Halfa	445	277	4040	2510		
Nile.	Aswan	345	214	4385	2725		
	Luxor	219	136	4604	2861		
	Qena	64	40	4668	2901		
	Girga	124	77	4792	2978		
	Assiut	141	88	4933	3065		
	Cairo	397	247	5330	3312		
	Delta Barrage ...	23	14	5353	3326		
	Rosetta mouth ...	236	147	5589	3473	Total length, 5589 kilometres or 3473 miles.	

SOURCES OF KAGERA RIVER TO RIPON FALLS.

Place.	Distance.		From source.		
	Km.	Miles.	Km.	Miles.	
Source	—	—	—	—	
Kagera mouth ...	590	367	590	367*	Karte von Deutsch Ost-Afrika. Reimer, 1895. 1 : 300,000
Ripon falls ...	218	135	808	502	Chart of Lake Victoria, by Com. B. Whitehouse, 1900–1.

Length of continuous waterway, 5589 + 808 = 6397 kilometres or 3975 miles.

obtainable, but it is not anticipated that those given above will be much altered.

The area of the Nile basin is given by Bludau† as 2,803,000 square

* As shown by Dr. Kandt, the length of the Kagera will be somewhat greater.—[ED. *G. J.*]

† *Pet. Mitt.*, 1897, p. 184.

kilometres (1,082,284 square miles), composed of 2,660,000 square kilometres (1,027,069 square miles), representing the area known to drain to the Nile, and 143,000 square kilometres (55,215 square miles) to the west of Lake Rudolf and south of the Sobat river, which was then unexplored. Taking this as the most recent value, it may be compared with a more complete estimate, which the recently published maps of the Sudan permit.

For determining the area of the catchment basin, the larger-scale maps which were used in measuring the length of the river are not necessary, for over almost all the basin there is a very small amount of topographical detail, so that the watershed between the different river-basins can only be approximately indicated. The area has therefore been calculated from a map on the scale 1 : 4,000,000 * for the Sudan and Uganda, and from one of 1 : 2,000,000 † for Egypt. The proportion of each square degree belonging to each basin was determined by measurement on the maps, and the area in square kilometres deduced from it. The results are given in the following table :—

AREAS OF CATCHMENT BASINS.

Name of basin.	Area in square kilometres.	Area in square miles.
Victoria lake	238,900	92,243
West valley ‡	54,100	20,889
Victoria Nile	75,600	29,190
Bahr el Jebel §	190,700	73,632
Bahr el Ghazal	552,100	213,175
Sobat river	244,900	94,560
White Nile	353,500	136,492
Blue Nile	331,500	127,998
Atbara	220,700	85,216
Nile	605,600	233,832
Nile basin	2,867,600	1,107,227

The area of the basin will vary according to the distance to which its limits are considered to extend on the west of the Nile northwards of Khartum. It has here been taken as far as the cliff of the desert plateau, or the first marked rise of the desert where the cliff is absent, probably, on the average, about 3 to 4 kilometres (2 to 2½ miles) from the edge of the cultivation. The whole of the Nile basin below Khartum, and practically all the White Nile basin, are non-effective in increasing the river-supply, since the occasional local cloud-bursts may

* I.D.W.O. Map, No. 1856, extended southwards to include the Victoria lake and its catchment basin.

† Topog. Div. Gen. Staff, 1905.

‡ Including the basins of Albert Edward and Albert lakes, and the Semliki river.

§ Including the Bahr el Zaraf.

be neglected. The Bahr el Ghazal, as has been shown by recent measurements of the volume discharged, is also practically non-effective.

All measurements have been made in the metric system, and the "rounded off" values converted to miles and square miles.

THE BAROTSE BOUNDARY AWARD.

By the award of the King of Italy, given in June of the present year, one of the last outstanding boundary questions between European powers in Africa, which has been awaiting solution now some fifteen years, has at last reached a settlement; and though the result has been to give this country a much smaller portion of the territory in question than had been claimed by those responsible for the preparation of the British case, it is, no doubt, well that the uncertainty which has so long prevailed as to the ultimate destination of the territory should once for all have been removed.

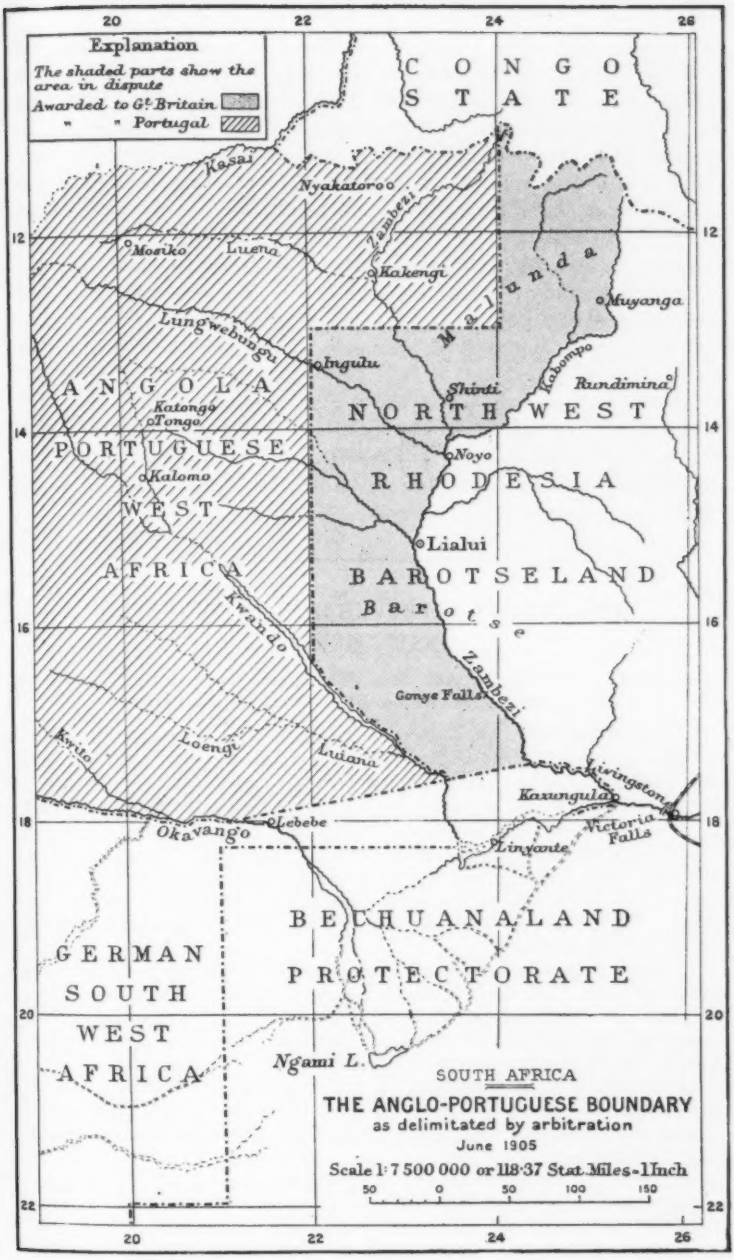
Owing to the length of time during which the question has been pending, it may be of interest to recapitulate the principal phases through which it has passed. The first attempt to reach a settlement was made in 1890, the year in which so many of the conventions determining the partition of Africa among the Powers were signed. In that year an agreement had been arrived at between the two Governments, but, owing to strong opposition in certain quarters, never received the necessary ratification. By this agreement, the course of the upper Zambezi and of its eastern branch, the Kabompo (then still by some regarded as the main headstream), was chosen as the dividing line between the two spheres. In the following year, after lengthened negotiations, a revised treaty was signed, and in due course ratified, according to which a basis for the final delimitation of the territory was arrived at, the actual work of fixing the boundary being left to a joint commission acting on behalf of the two powers. This was owing to the somewhat peculiar conditions under which the treaty was negotiated, neither contracting party possessing any definite knowledge of the greater part of the territories and tribes dealt with. Dr. Livingstone, then the principal authority on the upper Zambezi basin, had not left the immediate neighbourhood of the river until much further north; while at the time of his journey the normal tribal relations were suspended owing to the temporary supercession of Barotse sovereignty by the Makololo, a distinct and foreign people. Shortly before the convention was signed, however, Lewanika, paramount chief of the Marotse and neighbouring tribes, had gratuitously placed himself under the protection of the "Great White Queen," hoping thereby to best preserve the integrity of his dominions. This

British protectorate over the Barotse kingdom was in 1891 recognized by Portugal, the convention providing that the western limit of the territories of that kingdom should also form the international boundary. Great Britain therefore obtained distinctly more favourable terms in this region than by the abortive treaty of 1890; but, on the other hand, it must be remembered, the change on the lower Zambezi was equally to the advantage of Portugal.

The settlement of the question thus depended on the precise determination of the extent of the Barotse territories to the west of the Zambezi, and it is no matter for surprise that, when it became known that Lewanika claimed authority in this direction as far as the Kwito river, difficulties should again have arisen to delay a final arrangement. This led to the adoption of the *modus vivendi* of 1893, put forward by the British Government, which had recourse, as a provisional frontier, to the line fixed in 1890, though it was expressly stated that this should in no way prejudice the final decision. In the mean time, however, both sides were pledged not to extend their influence in any way across the Zambezi-Kabompo line in the direction of their neighbour's sphere, as had already, in fact, been provided for by an earlier *modus vivendi* of November, 1890. Portugal thus obtained, for the time being, a free hand in the disputed territory, Great Britain being, on the contrary, debarred from action within it. This state of things has been maintained until the present time, the proposed mixed commission for the delimitation of the territory on the spot having never taken shape, the alternative of arbitration being, after much delay, decided on.

As in so many previous cases, the decision is purely of the nature of a compromise. By the strict letter of the Convention of 1891, there is no doubt that this country might have expected to receive a larger share of the disputed territory, the line adopted certainly leaving to the west a considerable area over which Lewanika has exercised authority. Thus, as we are informed by Major Gibbons—the best, in fact the only first-hand, authority on much of the country in question—the principal chief of the Malunda tribe, which is apparently admitted to be subject to Lewanika, has been placed outside the larger part of his own dominions. On the other hand, the adoption of the Zambezi-Kabompo line in 1890, and again in 1893, was no doubt taken by the arbitrator as an indication that by following the strict letter of the agreement of 1891, its spirit would have to some extent been departed from. Be this as it may, geographers must certainly regret that the old unfortunate system of bounding political spheres by arbitrary lines, without any reference to physical, political, or ethnological facts, has in this case received a new lease of life.

As regards the value to this country of the territory assigned under the late award, Major Gibbons, who, from his personal acquaintance with it, is well qualified to pronounce an opinion, writes as follows:


Explanation
The shaded parts show the area in dispute
Awarded to Gt. Britain
" " Portugal
CONGO STATE
Kasai
Nyakatoro
Zambezi
Mosiko
Luena
Kakengi
Mwanda
Muyanga
Lungwebungu
Ingulu
Kabompo
Rundimina
Shirti
ANGOLA
Katongo
Tongo
NORTH WEST
PORTUGUESE
Kalomo
Noyo
RHODESIA
WEST
Lialui
AFRICA
BAROTSELAND
Barotse
Kwando
Zambezi
Gonye Falls
Kwito
Loengi
Luiana
Livingstone
Kazungula
Victoria Falls
Okavango
Lebebe
Linyante
BECHUANALAND
PROTECTORATE
GERMAN
SOUTH
WEST
AFRICA
Ngami L.
SOUTH AFRICA
THE ANGLO-PORTUGUESE BOUNDARY
as delimitated by arbitration
June 1905
Scale 1:7 500 000 or 118·37 Stat. Miles=1 Inch
50 0 50 100 150
20 22 24 26
12 14 16 18 20 22

"Unfortunately, when quality is considered, it must be admitted that the few miles to the east of the 24th meridian contain the only district that can ever be available for European settlement. This is for the most part between 4000 and 5000 feet in altitude, and has good prospects from the agricultural, pastoral, and probably mineralogical standpoint. It is well watered and healthy. The plain which lies between the Zambezi and Kwando, and extends to the Lungwebungu in the north, is perhaps the only useless district in the whole of the upper Zambezi basin. The greater part of it is a dry wilderness in the dry season, and swampy during the rains—flat, riverless, and poor. The northern half of this, where within hail of the Zambezi, Lungwebungu, and Luanguiga, and their subsidiary streams, may serve the purpose of a native reserve."

The accompanying sketch shows the position of the new boundary adjusted to Major Gibbons's map of 1901, but it is to be remarked that unless this was also adopted as authoritative by the arbitrator, the line as here drawn may not entirely represent his intentions in regard to the relation of the boundary to the general geography of the country.

SOME RECENT IMPROVEMENTS IN SURVEYING INSTRUMENTS.

By E. A. REEVES, F.R.A.S., Map Curator and Instructor in Practical Astronomy and Surveying, Royal Geographical Society.

In my paper read before the British Association in 1903, I endeavoured to point out the necessity for more accurate geographical survey work than has been attempted by the pioneer explorers and travellers of the past, and described briefly how this could be accomplished and the instruments most suitable for the purpose. If more accurate work has to be done, instruments capable of greater accuracy of observation than those carried by explorers for rough route-surveying must be used, and I have therefore lately given considerable attention to the subject of light and portable instruments suitable for the purpose of geographical surveying of the present time, and have made alterations to several instruments which will be briefly described in this article.

The most important instrument for the geographical surveyor is doubtless the transit theodolite; but this instrument in early explorations was rarely carried, as it was generally considered to be too heavy and bulky. The smaller vernier theodolites reading only to 30″ or even 20″ are not sufficiently accurate for astronomical observations, and to take a larger instrument was usually considered out of the question on small expeditions. Recently, instead of the ordinary verniers, micrometers have been more commonly fitted to theodolites, and these greatly increase the accuracy of reading, for although the micrometer head is usually only divided into 5″ or 10″, by estimation readings very much nearer can be taken. But these micrometers, and the projecting arms upon which they are carried, make the instrument very bulky, so that it has to be packed in two cases instead of one; besides which, they are very liable to be deranged and put out of adjustment. These reasons, together with the considerable additional cost owing

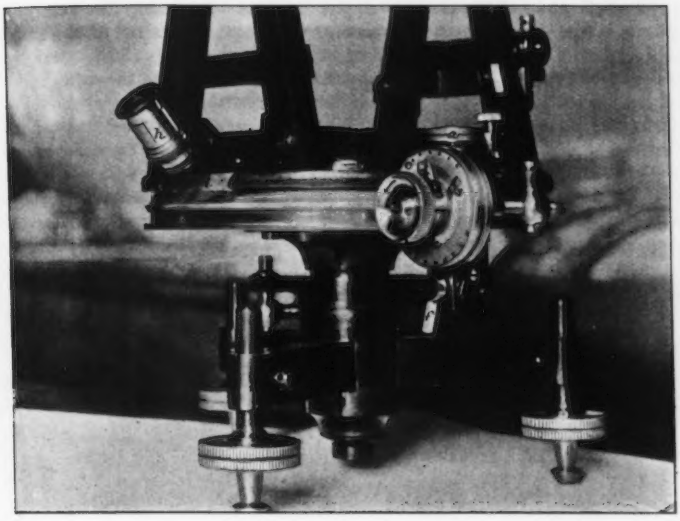


FIG. 1.

to the necessity of constructing four separate micrometers, have led me to see if it is not possible to construct a micrometer for theodolites which, while giving considerable accuracy of reading, shall be simpler, not so liable to be put out of adjustment, and less expensive; and in this I think I have more or less succeeded.

The Tangent Micrometer.—Fig. 1 shows this new micrometer arrangement fitted to the horizontal circle of a theodolite. *a* is a clamp screw of the ordinary pattern, and *b* the tangent screw, turned by the milled head *e*, for making the exact contact of an object on the intersection of the cross-hairs in the telescope. The tangent screw *b*, which is specially constructed for the purpose, carries the pointer *d* and the micrometer drum, the central part *k* of which, with the pointer *d*, is rigidly attached to the tangent screw. The outer rim or dial *c*, upon which are engraved the numbers representing single minutes and tens or fives of seconds of arc, also carried by the tangent screw, is separate, and only attached to the central part *k* by a spiral spring inside the drum. By means of this spring the outer rim or dial *c* is, in its normal position, kept with the 0, or zero, opposite the pointer *d*, which is effected by the stop *s*, attached to the dial *c*, being pressed by the spring against the pointer *d*. *g* is a clamp actuated by the lever *f*, by means of which the dial *c* can be firmly held in any position; in which case, when the tangent screw is turned the pointer *d* revolves without moving the dial *c*, and points to any required number on the dial. However, immediately the clamp *g* is released, the dial, actuated by the spiral spring, returns to its normal position with the 0 opposite the pointer.

Instead of a vernier, the upper plate carries a fine pointer, *i*, or two lines cut on glass, which overlap the degree and minute divisions on the divided arc of the lower plate, and these serve as an indicator as in the ordinary theodolite micrometer. There are two of these indicators, 180° apart, whilst *h* is a reading microscope for setting the indicators.

The differences of the measures of the tangents between any two intervals of ten minutes of arc for the degree or two represented by the run of the tangent screw from its centre to either end of its run are practically equal, especially as the micrometer drum is divided for a position midway between the centre and end of the run.

To use the tangent micrometer: When the clamp *g* is released, the pointer *d* remains at 0, the tangent screw, dial, and pointer all turn together, and the screw acts exactly as an ordinary tangent screw. Therefore, with the clamp *g* released, make the contact of a star or terrestrial object in the ordinary manner, adjusting finally with the tangent screw. To take the reading, first clamp the dial *c*, and looking through the reading-glass *h*, it will be seen that the pointer or indicating lines *i* are somewhere between two marks (10′ or 20′) on the arc. Now turn the milled head *e* of the tangent screw in the direction shown by the arrow, until, looking through the reading-glass *h*, the two indicating lines *i* include the preceding 10′ or 20′ mark, or that next less in reading than the position in which they stood when the contact of the object was made.

The complete reading will then be the reading on the arc—the degrees and the next less 10′ or 20′—plus the minutes and seconds of arc on the micrometer drum as shown by the pointer, as in the case of the ordinary micrometer. Both "A" and "B" readings can be taken with the same micrometer, for having taken the "A" reading as shown here, look through the other reader and take the "B" reading in exactly the same manner.

Any reading can be set upon the arc by reversing the above operation. To do this, first set the indicator *i* to the preceding 10′ or 20′ mark, then turn the drum of the micrometer until the pointer *d* indicates the required odd minutes and

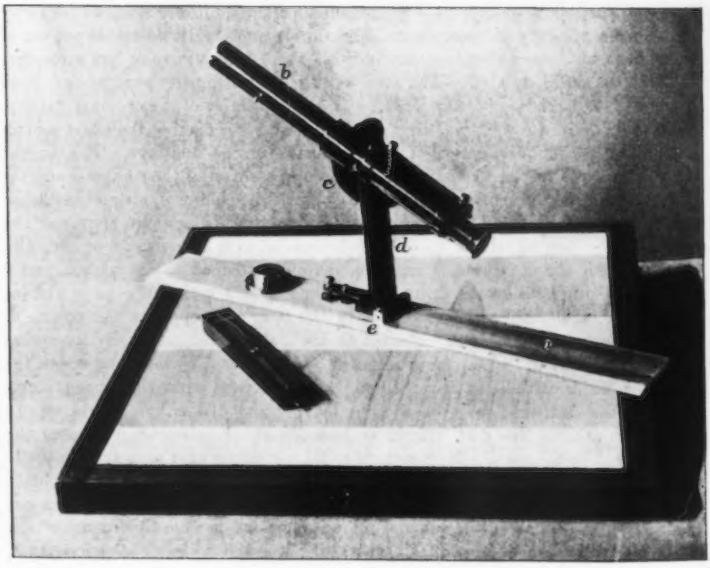


FIG. 2.

seconds. When this is done, clamp the drum of the micrometer and turn the tangent screw in the opposite direction to that for ordinary reading until the pointer *d* is at 0° on the micrometer drum.

The figure shows the micrometer fitted to the horizontal circle of the theodolite, but a similar one is also fitted to the vertical circle for reading altitudes.

This micrometer (which has been patented) is made by Casella, 147, Holborn Bars, E.C., and can be fitted to any ordinary theodolite.

Folding Telescopic Sights for Plane-table.—All who are accustomed to the use of the plane-table in surveying, know how much more accurately intersections of distant points can be made with a telescopic alidade than with the ordinary one; but the difficulty hitherto has been that the telescope is usually combined

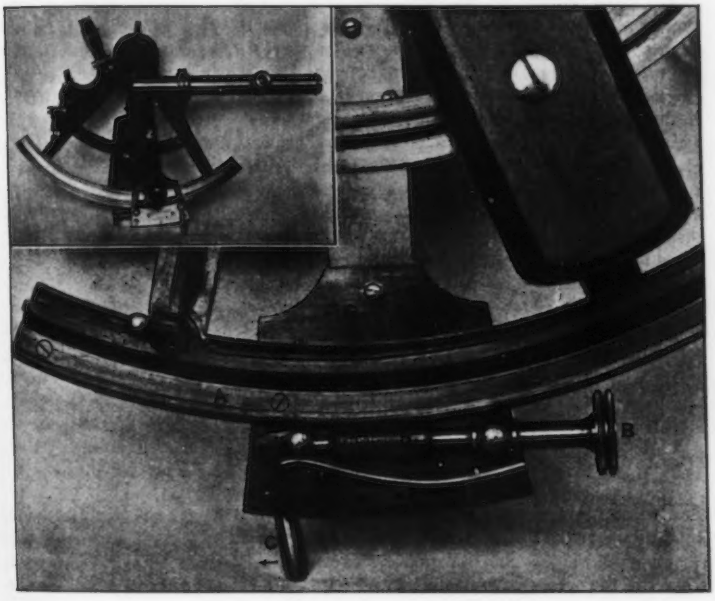


FIG. 3.

with other elaborate arrangements which have added much to the weight and expense of the instrument. It has therefore generally been necessary for the geographical surveyor to content himself with a plane-table with the ordinary rough sights, as the more elaborate instrument, which is, as a rule, a sort of plane-table and theodolite combined, is quite unsuited for the work he intends to do.

I have therefore had constructed a plane-table of the usual pattern, as shown in Fig. 2, but instead of the ordinary sights, upon the ruler *a* there is fitted a small and light telescope, *b*, with cross-wires, and a small vertical arc, *c*. The telescope pedestal *d* is hinged to the ruler at *e*, and the telescope and pedestal can be folded flat with the ruler. The whole can then be packed into a shallow box hardly any deeper than that which contains the ordinary alidade. The telescope

and pedestal being constructed of aluminium, there is hardly any additional weight, whilst the advantage for accurate sighting at distant points has proved to be considerable. The plane-table is of the ordinary simple pattern, but possesses a clamp and tangent screw for making accurate contacts.

Automatic Clamp and Endless Tangent Screw for Sextant.—The other improvement to which I would direct attention is an automatic clamp and endless tangent screw which I have designed for sextants. As is well known, it often happens that just at a critical moment in the middle of a set of altitudes, the end of the run of the tangent screw is reached, and great inconvenience and delay results. This is specially trying in the middle of a set of sextant altitudes. Fig. 3 shows a new clamp and tangent screw which obviates this difficulty, and now that it has been fairly perfected is working extremely well.

A is the section of the back view of an arc of a sextant, B the tangent screw upon which the endless thread D has been cut. C is a lever which, when pressed by the fore finger in the direction of the arrow, raises the screw D from the arc A by means of the cam arrangement F, in which case the vernier arm G can be freely moved to any position on the arc, and the approximate contact made in the ordinary manner. When this is done, by releasing the lever C, the screw D, actuated by the spring H, is pressed hard against the arc and automatically clamps the vernier arm G. The final and accurate contact is now made by turning the tangent screw B with the endless thread D, which causes the vernier arm to move slowly along the arc, as far as required, without the possibility of the screw coming to an end. The plane-table telescope and the endless tangent screw for the sextant (patent) are made by Cary, Porter & Co., 7, Pall Mall, S.W. Any sextant can be fitted with the latter at a small cost.

REVIEWS.

EUROPE.

A Mountain Observatory.

'Twenty Years on Ben Nevis.' By W. T. Kilgour. Paisley: A. Gardner. Pp. 154. *Map and Illustrations. Price* 1*s.* 6*d. net.*

The writer, who was intimately associated with the observatory on Ben Nevis during the greater part of its existence, "has endeavoured to tell in simple language something of the joys and sorrows, the exploits, the vicissitudes, and the reminiscences of the observers, as well as to portray the more outstanding incidents inseparable from an existence spent at such an altitude." He appeals to the public to agitate for the re-opening of the observatory, and in this all who are acquainted with the excellent work done during the time it was in being, will certainly be at one with him.

AFRICA.

South Africa.

'Die Kalahari.' Versuch einer physisch-geographischen Darstellung der Sandfelder des südafrikanischen Beckens. Large 8vo. Berlin: Dietrich Reimer (Ernst Vohsen). 1904.

In the author's usage, the term "Kalahari" includes the whole interior of South Africa north of the Orange river and west of a line drawn south from the confluence of the Kafue with the Zambezi, the region being bounded on the west by the high country behind the Damara-Namaqualand coast. This is a very great extension of

the district, usually known as the Kalahari, but the author justifies his usage by the fact that superficial deposits of the greatest importance in the physical history and conditions of the country characterize the whole area. Dr. Passarge's travels covered the middle portion of this great region, and his observations are very fully given in chaps. vi.–xxix. These chapters are such a mine of facts, that it would be difficult to gather their general bearing were there not frequent summaries and lists of conclusions, which are again brought under review in chaps. xxi.–xxxvii., where they are combined with the results of previous travellers relating not only to those parts of the Kalahari not visited by him, but to the whole of South Africa, and in some cases to tropical and North Africa also. One very great use of the detailed account of the middle Kalahari will be to form a basis for comparison in the future. Dr. Passarge pays great attention to the superficial deposits, *débris* from the underlying rocks, tufacious limestones, sand, rocks formed by the cementation of the sand by silica, and by the replacement of carbonate of lime by the same substance, laterites, and various river and vley deposits. The interest of these is not confined to the Kalahari, for they spread to the southern end of the continent. Dr. Passarge's researches (in which he received great help from Prof. Kalkowsky, the petrologist at Kiel) are the first attempt to deal with them on broad lines. To a Cape geologist who believes he has evidence of the formation of silicified rocks at the present day, the author's reasons for regarding their analogues up-country as the result of desert conditions which prevailed during the period between Upper Cretaceous and Pliocene (p. 649) are not conclusive. This question is intimately connected with a series of climatic changes since Karroo times, which the author endeavours to unravel. The evidence is not always convincing, *e.g.* that from Middelburg district in Cape Colony (p. 634); the presence of unweathered blocks of diabase (the Karroo dolerite of the Cape Geological Survey) on deeply weathered diabase is explicable without the assumption of desert conditions followed by a wet period which continued with diminishing rainfall to the present day. The diabase-capped hills, whose beautifully curved slopes owe their form to the action of running water as well as to the processes of insolation and wind-erosion, undergo little change by the action of ground water. Fragments broken from the diabase sheets lie undecomposed on the sometimes deeply weathered diabase of the lower ground, continuously subject to the influence of ground water. This contrast in the rate at which decomposition goes on in projecting and low-lying masses respectively, is particularly noticeable in the Transkei, where the climate is more favourable for chemical weathering than in the Karroo. The wide-spread tufacious limestone is certainly forming to-day, probably as energetically as during any period we have record of in Cape Colony—witness the choking up of small springs in the Karroo by calcareous matter left by evaporation of their water, and the thin calcareous crusts formed on bare spots after rain. These seem small details, but it is upon their like that our author's far-reaching conclusions are based.

Dr. Passarge makes out a very convincing case for his view that the Kalahari, in the wider sense, has become gradually drier, and that the process began in the south, and is extending northwards. In chap. xxvii. there is a very interesting account of the Okavango basin: a once well-watered low-grade river system is gradually losing its water, the valleys become converted into swamp lands, and these in their turn give place to sand-veld of the Kalahari type. This river system, which discharges both into the Zambezi and the Makarrikarri depression, was developed on an extremely old surface of the "Inselberglandschaft" type, *i.e.* there were wide plains covered with the products of insolation and wind-erosion and derivative rocks, through which isolated hills and short ranges of the underlying rocks projected. This kind of country, which is also met with in other parts of

Africa, is regarded by the author as the result of desert conditions which have prevailed with but one considerable interruption since at least the end of the Karroo period. The desert hypothesis is also held to account for the steep grade of African rivers (p. 637), but, as the author admits may be the case, the recent rise of the land has probably played an important part in giving the rivers their steep grades. At the south end of the continent there is evidence of a rise of 1200 feet, perhaps, within the period of living mollusca, and indications of a still greater "negative shore-movement" are not wanting, but the facts bearing on this question have not yet been consistently explained.

A full summary of the geology of South Africa is given in chap. iv., and the results are combined with the author's experience in chaps. xxiii. and xxiv., to form a mental picture of the development of the southern part of the continent. The summary is, on the whole, sound, and it is gratifying to find that the three subdivisions of the Cape system are taken to be successive formations, and the Black Reef—Malmani—Pretoria series to be older than the Cape system; the latter view is based upon a comparison of the tectonic structure of the north and south (pp. 47, 48), which has great weight. The value of the "Olifant-Komati line" as a division between two unlike portions of the country is not so great as the author thinks; a line which fulfils more of the conditions laid down (p. 63) joins the Olifant's mouth with the Keiskamma mouth, but this leaves the greater development of the Karroo beds to the north. On one important point the author is mistaken—the diabase intrusions so characteristic of the Karroo region are by no means confined to the middle and lower Karroo beds; they are almost or quite as conspicuous in the Stormberg series. Any one who writes an account of the development of the subcontinent on our present knowledge sets up a tempting mark for others to throw at, and it is only by a repetition of such processes that the story will illuminate the facts. Dr. Passarge shows that "Gondwana-land" may be much older than Suess thought it was, for the South African portion seems never to have been encroached upon by the sea since the Malmani-Campbell Rand limestones were formed, and these are of pre-Devonian age. The Bokkeveld (Devonian) encroachment was of short duration, and was confined to the south. A comparison of Natal and Pondoland with the western districts of the Cape does not support Dr. Passarge's suggestion (p. 595) that the Cape folded belt stretched eastwards beyond the Kaffrarian coast. No evidence has yet been produced to show that the west coast—at least, as far north as the Orange river—owes its form in any degree to faults. The statement on p. 596 that Karroo beds occur on the coast of Little Namaqualand is at best doubtful; neither is there evidence for the connection of the Drakensberg volcanic region with faults; recent work has upset the idea that the volcanoes are in linear series. Some, at least, of the south-east coast faults are post-Senonian; the great Worcester fault is much older than this, Triassic or early Jurassic in age, and the minor faults which follow the Worcester direction affect the Uitenhage beds, and may therefore be intermediate in age. Attention has already been called to the author's views on the post-Karroo history of the interior. Whether he is right in his succession of climatic changes or not, there can be no doubt that the interior has been dry land for a very long period.

The thirty-seventh chapter, a discussion of the meteorological conditions of the present and recent times, is of great interest to all South Africans, but it is not altogether pleasant reading. On p. 665 it is suggested that a stable condition has not yet been reached in South Africa, and the coming stability would seem to be another "Wüstenperiod"! Attention must be drawn to the admirable discussion of the importance of animal life, especially of mammals, in effecting surface changes in this region, given in chaps. xvi. and xvii., and to the numerous facts bearing on

this matter throughout the narrative. A chapter on plant-life in the Kalahari, and appendices on the pronunciation of native names, maps and figures, astronomical observations, rock specimens, mollusca, and plants, close the book, but there are also excellent indexes. Whatever may be the fate of some of Dr. Passarge's speculations, all geographers and geologists owe him gratitude for the thoroughness of his observations and the labour he has spent on their presentment.

A. W. Rogers.

Among the Headstreams of the Nile.

'Caput Nili: Eine empfindsame Reise zu den Quellen des Nils.' Von Richard Kandt. Berlin: D. Reimer. 1904. *Illustrations and Map.*

This is a striking book, which will stand out as one of the more permanently valuable amid the multitude of more or less ordinary works of African travel. The author's contributions to African geography have long been known to our readers. He is one of the comparatively few explorers who have been content to work doggedly in a limited field until they have gained that intimate acquaintance with its characteristics which can never be acquired by the passing visitor, and he possesses other qualities which go to make a successful student of a new country, notably the spirit of inquiry which ever seeks to go below the surface of things. The result is that his book, though professing only to give such an account of his work as may be suitable to the general reader, contains abundant food for reflection for the more seriously minded, while running through the whole is a lighter vein which enlivens the record of many disheartening struggles with adverse circumstances. It is, however, his keen appreciation of the romantic and imaginative elements in his subject which above all distinguishes Dr. Kandt's book, and which justifies his designation of it as the record of a "sentimental" journey. Whether in describing the parched and all but lifeless vegetation of the African steppe, the imposing silhouettes of the Central African volcanoes, or the moist primæval forest which conceals the ultimate headstreams of the Nile, he is always able to seize the essential elements of the picture, so that the reader carries away with him an impression of life-like vividness. The region specially chosen as a field for exploration offers unusual scope for the exercise of such powers, and in describing his journey as one "to the source of the Nile," Dr. Kandt no doubt gives us the clue to the special attraction which it exercised upon him. Whether or no the claim thus made be regarded as justified, there is no gainsaying the fact that Dr. Kandt was the first to set eyes on the ultimate source of the famous river—in the sense of the origin of that branch which brings the largest supply from the greatest distance. And there is something, no doubt, to be said for the view that it is only in this sense of the word "source" that the use of the definite article is at all applicable—whether such use is, even so, justifiable on scientific grounds being another question. Dr. Kandt reserves for another volume the elaboration of arguments in support of his claim, though it may be doubted whether our knowledge of the meteorological and other conditions of this part of Africa is yet sufficient to allow a definite opinion to be pronounced on the question.*

* Some indication of the comparative *rôle* of the Victoria Nyanza and the Kagera in the economy of the Nile may, perhaps, be supplied by the consideration that while the loss of the supply received from the Kagera would seriously affect the status of the lake, there is no reason to suppose that, had the basin of the lake not existed, the supplies carried to the Nile by the river would have been materially lessened. But in order to reach any definite conclusion, some knowledge of the rainfall and evaporation on the surface of the lake and over the basin of the river is of primary importance. It

As regards the shores of Lake Kivu, which he surveyed with so much perseverance, Dr. Kandt gives likewise much new information. But it is not only for its delineation of natural features that the book is of interest. The author has much to say on the peoples with whom he was brought in contact, their characters and idiosyncrasies, which have evidently been the subject of thoughtful study on his part. His chapter on native caravan life, though not altogether pleasant reading, supplies, at any rate, an unusually vivid picture; while his accounts of the natives and political organization of Ruanda—of all African states the one which has longest lain off the beaten track, even of native lines of communication; of the Batwa dwarfs of the region of the great volcanoes; and of other tribes, such as the Bakiga, whose inveterate thieving habits gave him so much trouble, are of still higher interest in proportion to the little that has hitherto been written about them.

It should be mentioned that, while the freshness of the narrative is maintained by a liberal use of the diary form, the objections often attaching to this method are lessened by the very careful elaboration to which the original journals were subjected from time to time during the course of the journey, the results of more mature reflection or subsequent experience being in this way incorporated. Lastly, the avoidance of the use of the objectionable loaded paper, now so common, adds immensely to the attractiveness of the book, and in no way detracts from the clearness of the excellent illustrations.

Western Uganda.

'On the Borders of Pigmy Land.' By Ruth B. Fisher. London: Marshall Bros. [1905.] Pp. x. and 216. *Illustrations. Price* 3*s.* 6*d. net.*

This work is valuable as presenting the views and impressions of one who has not merely passed through the country at a rapid rate, but has resided in it for several years, maintaining a close and constant intercourse with the natives. The writer is the wife of the Rev. A. B. Fisher, who read a paper before the Society in 1904 (*Journal*, vol. **24**, p. 249). There is a chapter on the pygmies, and another on the partial ascent of the Ruwenzori range.

Zanzibar.

'Zanzibar in Contemporary Times.' By R. N. Lyne. London: Hurst & Blackett. 1905. Pp. xii. and 328. *Maps and Illustrations. Price* 10*s.* 6*d. net.*

This is the first attempt which has been made to write the history of Zanzibar, and especially of British relations with it, in modern times. The author, who belongs to the Government service, has made careful researches in the archives of Government departments at home, and by his intercourse with past and present residents, has been able to place on permanent record many interesting details of the history.

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may, therefore, be worth while calling attention to what appears to be a fallacy in the estimate made by Sir W. Garstin (in his admirable and exhaustive report on the basin of the upper Nile) of the evaporation from the surface of the lake. Having estimated the amount of water entering the lake in one year (whether as rain or by rivers), and leaving it by the Ripon falls, he proceeds to obtain the "total cubic content of the water added to it in one year," adding this to the amount leaving the lake, and then deducting the sum from the amount received; the result being, in his view, the amount lost by evaporation. But in order to justify this proceeding, the amount taken as added to the lake should surely be the *net* gain during the year (supposing such to exist), and not the gross amount corresponding to the difference between the lowest and highest level, which is the quantity obtained by Sir W. Garstin on the basis of the mean annual range of level. His value for the amount lost by evaporation will thus be far too low, supposing the other estimates to be fairly correct.

AUSTRALIA.

Queensland in Early Days.

'Tom Petrie's Reminiscences of Early Queensland.' Recorded by his Daughter. Brisbane: Watson, Ferguson & Co.; London: J. Gray & Son. 1904. Pp. xvi. and 320. *Plan and Illustrations.*

Books such as this will become of increasing value as the race of early settlers dies out. The present reminiscences were taken down (by his daughter) from the lips of one who was associated with the Queensland aborigines from early boyhood, and gained an unusually intimate acquaintance with their manners, customs, folk-lore, and the like, a knowledge of which is here rescued from oblivion. There is also much that is of interest concerning the early settlement of the colony.

THE MONTHLY RECORD.

EUROPE.

Examples of River-capture in France.—M. E. Fournier calls attention in the *Comptes Rendus* of the Paris Academy of Sciences to some instances of river-capture which are remarkable for the very recent date at which the captures have taken place. The district is that watered by the Vallière and several of its tributaries, small streams belonging to the eastern part of the basin of the Sâone, in the department of Jura. By a study of maps and documents dating from the seventeenth century onwards, M. Fournier has found that the relations of these streams has several times changed during the last two centuries and a half, the Sorne, in particular, having (in one or other of its branches) suffered a constant displacement towards the north, abandoning in turn no less than three different channels by which it found its way to the Vallière. The accuracy of the maps and documents is confirmed in one particular by the fact that one of the later branches is crossed by the boundaries of properties as if it had no existence, while in most cases these follow the courses of streams. These examples are, perhaps, somewhat discounted by the fact that the district is part of an alluvial plain without much relief, in which changes in the courses of streams are only to be expected. A more striking instance, though dating from more ancient (if geologically recent) times, is the probable deflection of the course of the Vienne in the neighbourhood of Exideuil, a note on which has been contributed to the *Annales de Géographie* (March 15, 1905), by MM. Blazac and Vacher. The idea which has hitherto prevailed is that the sudden bend to the north made by the Vienne below Exideuil marks the position of a capture of its upper course, by a stream flowing to the Loire, at the expense of the Charente, the direction of which corresponds to that of the upper Vienne. This capture has been thought to have occurred in Pleistocene times, and the small stream flowing by the village of Pomaret has been supposed to occupy the abandoned channel leading to the Charente. As is pointed out, however, by the writers in the *Annales*, the facts do not entirely fit in with this view. The V-shaped form of the Pomaret valley near its confluence with the Vienne gives the impression of a recent valley, rather than of an old valley now drained in a reverse direction to the original; while careful search has failed to reveal the existence of alluvial deposits on the line of partition between this valley and the Charente. The authors do not, however, entirely reject the idea of a capture having taken place, but they point out the existence, on a line running from east to west across the

plateaux between the Vienne and Charente, of a series of deposits, mostly fluviatile, at a much higher level than the present river valleys, higher, in fact, in places, than the water-parting between the existing rivers in the area under discussion. The age of these deposits is in all probability Pliocene, and the writers therefore conclude that a capture of the ancient upper course of the Charente took place either at the end of the Pliocene or at the very beginning of the Pleistocene age.

Transport Problems, especially in France.—Prof. Louis Lafitte, of Nantes, has recently published a series of articles on this subject in the *Questions diplomatiques et Coloniales* (July, August, and September, 1904). In them he points out how important a *rôle* improved means of transport play in modern economic expansion, internal and external. He notes the great reduction in cost of ocean transport in recent years—the rate per tonne from Marseilles to China being 335.70 francs in 1872, while it now is between 70 and 75 francs. Of means of transport, that by water is by far the most economical, and he gives as mean rates for France 1 centime, for German rivers, 0·8, and for the United States, 0·48 of a centime per tonne-kilometre. By *petite vitesse* the railway freight in France is 4·7 centimes per tonne-kilometre. In spite of low rates, Germans calculate that the cost of their products is raised 30 per cent. on an average, in Britain 15 per cent., and in the United States still less, owing to charges for transport, but that they save £3,400,000 per annum by using canals and navigable rivers. They have paid great attention to these rivers and canals, as recent monographs show, and also to harbour improvements with startling results. The traffic on the Rhine has risen of late by leaps and bounds, and the tonnage of vessels entering and clearing at Hamburg (with cargoes) has increased from 9,417,817 in 1892 to 14,414,370 in 1902. The French railways, by careful study of the international "transit trade," have greatly added to their incomes, and compete successfully, for instance, for English, Swiss, and Italian traffic, the quickest route by the St. Gothard being *viâ* Boulogne and Laon. The tourists from London to Switzerland by the Belgian route was 7149 in 1898, but only 4521 in 1902 (decrease 42 per cent.), whereas by the French line it was 7833 in 1898, but 17,685 in 1902 (increase 172 per cent.). New cross-country routes are recommended—that from St. Nazaire and Nantes by Tours, Bourges, Nevers, and Chanzy is meant to secure Swiss trade through Belfort and Lons le Saunier; and even Austrian traffic through the former, and Italian trade through the latter and the new Simplon tunnel. Several programmes for the amelioration of French waterways have been drawn up. Political as well as economic reasons have resulted in the north-eastern system, serving Paris alone, being well developed. The latest, that of Pierre Baudin, will not only add to the utility of these north-eastern waterways, especially by improving the Seine and the chief harbours, but will revive the Loire as a navigable waterway (where the tonnage between the Maine and Nantes has sunk from 303,431 in 1866 to 92,541 in 1902), and provide for greatly needed improvements at Nantes and St. Nazaire. Bordeaux, the Canal du Midi, the Rhone, and Marseilles will be ameliorated, and, what is perhaps most important, the long-talked-of tunnel to connect Marseilles with the Étang de Berre and the Rhone will at last be carried out. By such improved waterway and railway services, the French, examining the geographical conditions and striving to utilize them fully, hope not merely to improve their own internal trade, but to secure a greater share of the *entrepôt* trade.

Vertical Earth-temperature Gradient above the Simplon Tunnel.—The temperatures observed in the rocks of the Simplon tunnel are discussed by Mr. F. Fox in the *Proceedings of the Royal Society* (vol. 176, pp. 26–33, April, 1905). The figure is 97°·7 Fahr. (54°·3 C.) at 2135 metres below the summit; and

assuming that at 10 metres below the surface of the mountain the temperature is 6° C., the temperature gradient is 1° Fahr. to 71·5 feet (1° C. to 39 metres). Taking the mean of the altitudes above and temperatures at stations between the 8 and 13 kilometre posts in the tunnel, the vertical gradient works out at 1° Fahr. to 67·5 feet (1° C. to 37 metres). The Simplon data thus correspond very closely with the average value which is derived from previous observations in tunnel mines and boreholes.

Trade of Bosnia and Herzegovina.—The Government returns of imports and exports for Bosnia and Herzegovina issued since 1898 indicate a steady increase of exports down to 1902. By weight the imports stood to exports in 1898 as 1 to 2, but in 1902 as 1 to 3·1. The year 1903 still showed a rise in exports, but a still greater rise in imports; so that the proportion between the two was 1 to 2·3. The great increase in imports was due to the greater demand for corn consequent on the bad harvest of 1902, and to the increased import of live-stock both for slaughter and draught. Though in this respect the imports fell from 13,000 head in 1900 to 5000 in 1902, the figure has still risen from 9000 head in 1898 to 20,000 head in 1903. The export, on the other hand, has risen from 244,000 to 328,000 head. The previous year it had mounted to 349,000. These last advances are to be explained by the building of the railway from Serajevo to the Turkish frontier. The foreign trade of Bosnia and Herzegovina consists, roundly speaking, in an exchange of natural for industrial products. Owing to the unfavourable weather during the period in question, the export of cereals did not reach the figure that might be expected. Timber for building and other economic purposes, as also horned cattle and dried plums, have, on the other hand, shown a greatly increased export, the former by the value of 14 to 15 million crowns (1 crown = 10s.), the latter by 6 millions. The greatest increase in imports has been in clothes and linen and in articles of food and luxury, such as coffee, sugar, wine, and butter, as also in machinery and implements. Of the last item, the greatest portion comes across the Croato-Slavonian frontier, the import thence during the period in question having risen from 79 to 86 per cent., whereas the export thither fell from 87 to 68 per cent. of the total. By way of the Dalmatian frontier, on the other hand, the import has fallen from 19 to 13 per cent., whereas, thanks to the railway connections constructed during the period, the export has risen 2½ fold; 75 to 77 per cent. of the import and export now running on the railway lines. Water and road communication in Bosnia and Herzegovina, as throughout the whole of Austria, has declined considerably commensurately with the increased use of railway transport.

ASIA.

Mineral Resources of Ceylon.—With a view to an estimate of the economic mineral resources of Ceylon, two English geologists have, under the general supervision of Prof. W. R. Dunstan, of the Imperial Institute, been at work since March, 1903, surveying the island. Between April 6, 1903, and January 7, 1904, they have transmitted to the Institute seven reports, and with each report specimens of minerals collected by them. The specimens thus transmitted have been carefully examined in the scientific and technical department of the Institute. An account of the results of such work in 1903–4 is embodied in a Colonial Report (Miscellaneous, No. 29, 1905). The mineral products, collected during the survey, or obtained from other sources, which had been investigated at the Imperial Institute, includes ores of iron, manganese, and copper, ores containing thorium and cerium, the oxides of which are available for incandescent gas-lighting; graphite, mica, steatite, kaolin, laterite, asbestos, limestone, quartz, chert, corundum, and

various gem-stones. The iron ore is in all cases a surface deposit, due to the decomposition of the older rocks, and up to the present has not been found in sufficient quantities to be economically important. Nor apparently does manganese ore exist in quantities available for export, but the presence of 1·61 per cent. of cobalt in the manganese ore from Ampitiya calls for further investigation. The most important discovery, however, is that of several minerals containing thoria. Taken to be uraninite, or pitchblende, and forwarded as such to England, one of these minerals, on complete analysis at the institute, proves to be a new mineral which it is proposed to name thorianite. It is one of the richest known in the rare earth thoria, of which it contains more than 75 per cent. uncombined with silica. Thoria is of very considerable value on account of its employment in the manufacture of incandescent gas mantles. At present the material is chiefly extracted from the monazite sands of Brazil, containing 5 to 10 per cent. of combined thoria. The announcement of the discovery of thorianite in Ceylon, as well as "thorite," containing over 65 per cent. of thoria, has already called forth many offers from England and the continent to purchase the material or work the deposits. At present, however, only a few tons are in sight. For the determination of the extent of the occurrence of the above minerals in Ceylon, further exploration is needed.

AFRICA.

Progress in Egypt and the Sudan.—Lord Cromer's report for 1904 records as satisfactory an amount of progress as any of the preceding ones. As regards Egypt, it is stated that the year under review was one of "unexampled prosperity," though the writer wisely sounds a note of warning against an "exaggerated optimism," of which he thinks there may be some risk. Of topics of specially geographical interest, reference may be made to the increased grant for the geological survey, to enable it to be pushed forward with greater rapidity, and to the proposed beginning of a proper hydrographical survey of the Nile, in the form of a determination of levels along the river-banks, the establishment of a gauging station above the second cataract, and other works. The meteorological stations in Egypt and the Sudan are to be more completely equipped, and their observations published, while preparations are being made for the measurement of an arc of the meridian, as recommended by the International Geodetic Congress. It is also of interest to note that, so far, the state of the temple at Philæ is extremely satisfactory, though it is no doubt too soon to pronounce whether damage may eventually result from the flooding. The proposed heightening of the Assuan dam has been abandoned for the present, so that further measures for the protection of the temple, which might be necessary in view of the further submergence which would result, need not yet be discussed. In the Sudan, the progress in the direction of increased security and confidence in the intentions of the Government is decidedly satisfactory. Even on the remote frontiers the central authority is becoming gradually recognized, and much good seems to have resulted from the demarcation of the frontier with Abyssinia. On the side of the Congo State agreements have been arrived at between the Anglo-Egyptian and Belgian authorities regarding the northern boundary of the Lado enclave and the "Thalweg" of the Nile between Lado and 5° 30′ N., but at the date of the report they had not received the formal ratification of the Congo Government. Difficulties which had arisen with the Nyam-nyams have been completely removed, as the result of a military expedition under Major Boulnois, and in the same direction it is hoped to develop trade with the French Congo territory, by placing a small steamer on the Jur river. Various expeditions have been undertaken for the

exploration of little-known districts, including one under Mr. Dupuis for the further examination of the country traversed by Captain Liddell (*Journal*, vol. 24, p. 651) with a view to ascertaining the possibility of opening up a new river-channel from Bor to the Sobat. An exploration of the Pibor, or south-western branch of the Sobat, was made by Lieut. Comyn, who succeeded in penetrating far beyond the junction of the Akobo, but was stopped by shallow water when within about 60 miles of Bor, so that the ultimate source is still a matter of uncertainty. Mr. Macmillan, the results of whose expedition have been given in the *Journal* (vol. 25, p. 158) has despatched Mr. Jessen for further exploration between the White Nile and Abyssinia. Useful work has already been done by Captain Borton, by Lieut. Bayldon, R.N., and others, in various parts of the Bahr-el-Ghazal province, the latter having collected information on the Bahr-el-Arab and other streams of the north-west, while Captain Percival has undertaken an expedition south from El-Obeid to Wau with a view to further elucidate the hydrography of this region.* The cutting of the sudd, both on the Bahr-el-Jebel and on the Bahr-el-Ghazal, has been continued with much perseverance, while the detailed surveys under the direction of Colonel Talbot, R.E., have been actively prosecuted. Lastly, reference should be made to the rapid progress made on the railway from the Nile to the new Red sea port near Suakin, which it is hoped to complete by the spring of 1906.

Agriculture in British East Africa.—The latest official reports (Africa, No. 4, 1905) from the Director of Agriculture on the Nairobi and Naivasha farms, tell the tale of abnormal drought in 1904. A special report, appended to these returns, sets forth summarily the main conditions new settlers in the protectorate have to reckon with. The rainfall at Naivasha in 1904 amounted to but 21·87 inches, at Nairobi to 27·40 inches—a supply altogether inadequate to the wants of a porous soil under a tropical sun. The month of largest rainfall at Naivasha in 1904 was November, with 2·87 inches; of smallest, January, with 0·53 inch. At Nairobi 5·83 inches fell in November, whereas September was rainless. At Naivasha the mean temperature in November was 63°·13 Fahr.; at Nairobi the mean monthly temperature was 64·09° Fahr., the maximum for the year being 84°, the minimum 44°. The life and experiments on the two farms are illustrated by photographs. The agriculture of the protectorate, though not yet adequately represented in the exports, is proceeding at a fair pace. East Africa, which two years ago counted not more than six European farmers, now counts as many hundreds. The main sowing begins with the first of the greater rains (March—May), the crops ripening in the dry months from June to October. The tropical region, hitherto eyed askance on account of its climate, is a coast belt 100 miles broad, its richest strip lying within 20 miles of the sea. About 100 acres of it are now planted with cotton, of which it should yield 300 to 400 lbs. per acre in the form of lint. Rubber (*Landolphia*) is most widely distributed. Sanseviera grows wild, producing fibre 3 to 7 feet long, valued at £25 per ton. A variety of fruits are cultivated by the natives, but, ignorant as they are of grafting, the fruit they raise is poor. In view of a ready market in the temperate regions, Mombasa, and the ships, there is here a good opening for fruit farms. It is also pointed out how profitable would be a dairy business near Mombasa, supplying the town, ships, and Zanzibar. In the central districts, from 100 to 250 miles inland, Indian settlements are making rapid progress. The cotton crop is estimated to yield about 1400 lbs. per acre. Besides cotton, the climate is suitable, probably, for Ceara rubber and fibres, and large concessions have been taken up for

* Captain Percival has successfully completed this expedition, and has returned to this country.

working these products. In the lake district many Europeans have settled, attracted by the richness of the land and abundance of rain.

Volcanic Formations in the Sahara.—A note in the *Comptes Rendus* of the Paris Academy of Sciences for May 1 last gives the results of the geolcgical researches during M. Foureau's trans-Saharan expedition, as far as concerns the distribution of volcanic formations in the regions traversed. The first rocks of this nature were picked up north of, and in, the great Erg, in the form of scoriæ and basaltic lavas, having their origin, probably, in the Ahaggar massif; the eruptive nature of certain mountains in which, spoken of by Duveyrier, is thus confirmed, as it is also by recent explorations by Lieuts. Guillo-Lohain and Basset. Duveyrier has also been shown to be correct in his view of the geological character of the southern crest of the Tassili, which has also yielded basaltic scoriæ. Volcanic formations are extensively represented in the "Adrar," where, besides basalts and phonolites, tephrites with olivine play an important part. But the greatest development of volcanic formations occurs in southern Air, where a whole series of lavas, scoriæ, and tuffs seems to descend from the peaks of Taguet, Kombo, and others further east. These basaltic volcanoes seem to be of quite recent age, to judge from the frequent occurrence of cirques and basins, which seem to represent the actual craters of the volcanoes.

AMERICA.

Exploration in the Sierra Madre, Mexico.—An expedition for the study of the geography and geology of the western Sierra Madre of Mexico was organized early in the year by Colonel W. C. Greene, and left New York on February 4. The party consisted of Mr. R. T. Hill, Dr. E. O. Hovey, and assistants, and the scientific qualifications of the gentlemen named promise valuable results as regards the physical geography of the interesting region chosen as a field of work. Communications by Dr. Hovey, printed in *Science* for April 14 and June 9 respectively, give a summary of the doings of the party while exploring the northern part of the Sierra Madre. A delay at El Paso, caused by snowfall in the mountains, was utilized for a run across the arid region along the Mexican boundary as far as Naco, Arizona, and thence to Cananea, Sonora, the railway route followed affording excellent opportunities for study of the geological processes at work. Dr. Hovey mentions especially the *bolsens*, or pocket deserts (with accompanying volcanic cones and basaltic floors), containing underground watercourses, and supplying, by means of shallow wells, abundant water for mining purposes. The Mesa phenomena of the region were specially studied. From El Paso the party went south-westward by railway into Chihuahua, making studies *en route* of the vast llanos, the peculiar moving sand-hills known as "los Medanos," the lost mountains, and the shallow periodical lakes without outlet which receive the drainage and wind and water-borne *débris* from the Sierra Madre. From Lake Guzman the route followed the San Miguel river, in part through deep tortuous cañons, to its headwaters on the undulating plains of the Sierra Madre plateau, more than 7000 feet above the sea. From Casas Grandes, the terminus of the railway (where a visit was paid to the prehistoric ruins which give the town its name), the journey was continued on horseback and with pack-team across the high plateau to Dedrick, consisting of one or two log houses in the midst of the forest of long-leafed yellow pine which characterizes the plateau and peaks between 7000 and 8000 feet. Immediately to the west of this is the stupendous cañon of the Yaqui, which in beauty and grandeur rivals that of the Colorado. Important facts relating to the physical history of the region were observed, and the ruins left by the cliff-dwellers and other prehistoric peoples examined. From Guaynopita, a little mining camp on the mountain-side,

a climb of 3500 feet led out of the cañon on to the great Mesa, out of which the mountains have been carved. Here the contest for the drainage of the plateau between streams flowing east and west was observed, the dissection being more pronounced to the west. The cañon of the Tutuaca (a tributary of the Yaqui) disclosed a section through vast beds resulting from igneous action, which has been accompanied and followed by strong mineralization of veins. The further route led across a series of high mesas, divides, "arroyos," and river channels, until it finally reached the crowded mining camp of Ocampo. Hence to Miñaca, the terminus of the Chihuahua and Pacific railway, the high mesa was again crossed, the train being taken back to El Paso, so as to complete a circuit among the Western Sierra Madre mountains. The detailed reports on the journey will be awaited with interest.

Natural Mounds in the United States.—A paper read by Mr. A. C. Veatch at a meeting of the Biological Society of Washington in January last, and reported in *Science* for February 24 (vol. 21, No. 530, p. 310), has revived the interest in the question of the origin of the natural mounds found in so many parts of the United States, which have been the subject of discussion for a number of years, without, however, any decidedly satisfactory explanation being arrived at. A discussion has since been maintained in the pages of *Science*, in which Profs. Branner and Hilgard, and other observers who have paid attention to the problem, have taken part (see Nos. 535, 536, 538, and 543). The evidence adduced is on certain points conflicting, and there can be little doubt that the observations have to do with phenomena of diverse origin, however striking the superficial resemblance may be. In any case, it is remarkable how widely distributed over various kinds of country such mounds (known sometimes as "hog-wallows") appear to be in the United States, whereas in hardly any other part of the world have such features been observed in sufficient numbers to attract general attention. Mr. Veatch considered especially—among the various theories put forward—those which explain the mounds (1) as due to the action of gas vents and springs; (2) as a form of dunes; (3) as the work of ants; considering that the last has most in its favour, whether we suppose the agents to have been the "atta," or leaf-cutting ants, or the mound-building variety of termites. But if either of the theories (2) and (3) be correct, he considers that important climatic changes must have taken place in very recent times. Dr. Branner, speaking especially of the mounds of California and Oregon, where they cover hundreds of square miles, points out that they extend from the valley floors to a height of over 500 feet up the slopes of the foothills, and that the underlying rocks vary from Pleistocene gravels, sands, and clays to granites, schists, and folded Palæozoic slates. The form seems to differ from that of existing ant-hills, though on this he lays no great stress. Sections show no differentiation of structure from the surrounding areas, though the soil is generally hard and clayey, sometimes with quartz, feldspar, etc., and is not regarded as good. As an alternative to the ant-hill theory, Dr. Branner throws out the suggestion of a possible "concretionary action on a large scale due in part to chemical and in part to physical conditions." Prof. Hilgard decidedly favours the idea of an ant-hill origin, and shows that existing species of ants produce a counterpart of the Louisiana mounds, though the causes which led to the depopulating of the latter are still obscure. He mentions examples of mounds which are certainly due to wind or water action. Mr. W. J. Spillman thinks that the mounds have originated in various ways, and that in South-West Missouri they may be attributed to the occurrence of concretions of flint in the sub-Carboniferous limestones. Elsewhere, however, he says that the mounds are specially marked by the luxuriance of the vegetation on them. Lastly, Mr. A. H. Purdue, after pointing out that existing ant-hills (which, in the Arkansas valley, are found in close association with the

mounds) are diminutive as compared with the latter, is inclined to ascribe the phenomenon, like Prof. Branner, to a chemical cause, due to the action of ground-water; the limited geographic distribution being perhaps a result of climatic conditions.

Levelling across the United States.—Dr. J. F. Hayford has called attention (*Science*, April 28, 1905) to the recent meeting at Hunt's junction, in Washington, of two lines of levelling carried out by the United States Coast and Geodetic Survey from the east and west respectively, the first connection by precise levelling between the Atlantic and Pacific being thus completed. The discrepancy at the junction was only 0·615 foot, and the question of a possible difference in level between the two oceans is not set at rest, the amount of the discrepancy (which places the Pacific at an apparently higher level than the Gulf of Mexico and the Atlantic) being possibly due to errors either in the tidal observations or in the levelling operations, or both. The extremely small discrepancy observed is well within the possible limits of error of the precise levelling alone, being only about two and half times the *probable* error. The operations were carried out with remarkable speed, the average rate of progress during the period 1900–1904 being 64 miles per month—giving a total of 3900 miles. In a subsequent number of *Science* (June 2, 1905), Mr. E. H. Williams points out the discrepancies which may arise, even within a few years, owing to vertical movements of the Earth's crust.

The Indians of the Santa Barbara Islands, California.—In the beginning of last year Dr. G. Eisen contributed to the Royal Bohemian Society of Sciences at Prague a paper dealing with the early inhabitants of the Santa Barbara islands, in which he embodied the results of his visits in 1873 and 1897. A reprint of this paper has recently been published in London by Messrs. A. Owen & Co., and is a useful summary of information on a little-known and now extinct race of Indians. The Santa Barbara islands lie off the coast of California, outside the Santa Barbara channel, and consist of two groups of four islands each. A central ridge runs along the whole group, varying in height between 800 and 2200 feet. Both as regards climate and productions, the islands were well suited to support a native population. They were at one time thickly populated with Indians, who have been extinct since 1853. The two southern islands of the group were discovered by Juan Rodriguez Cabrillo, in 1542, and in 1602 Sebastian Viscaino landed on the island of Catalina, and afterwards made a chart of his discoveries. The San Franciscan missionaries, who settled in California in 1769, also contributed to our knowledge of the Indians, the narrative of Miguel Costansó, a member of one of the expeditions, being of special interest. The Indians of the Santa Barbara islands appear to have been a finer race than those further north, and were of a peaceful nature, but cunning thieves. Their language was apparently largely related to the "Chumash" spoken by the Indians on the mainland of Santa Barbara country. The sites of the Indian villages were generally close to the shore and in proximity to fresh water. These are now represented by shell-heaps, which are numerous on all the islands, and vary in size, the largest one seen by the author being about 300 feet long by 50 feet wide, and about 10 feet high. They disclose a number of skeletons and utensils of various kinds; implements and ornaments have also been found. In discussing the question of the extinction of the island Indians, Dr. Eisen considers that they were largely exterminated by white settlers, such as otter hunters, sheep owners, and others, and by diseases introduced by white men, while their changed mode of life after the advent of the missionaries is referred to as a most important point in connection with the subject.

Mining in British Columbia.—The report for 1904 of the Minister of Mines for British Columbia shows that year's mineral output to have reached a value of $18,977,359 (over $100 per capita for the entire population of the province), an amount exceeded only in 1901. Of the minerals produced in 1904, the most valuable were lode gold, amounting to $4,589,608, and coal, $3,760,884. The coal output of 1904 was exceeded by that of each of the years 1899–1902; 1904, however, shows a greatly increased output of ore, amounting to nearly 1½ million tons—nearly 14 per cent. over that of 1903. Placer and lode gold being assigned to different categories, this year, for the first time in the history of the province, the total product of the coal-mines from their first opening takes the first rank among the items of the total mineral production to date, amounting (coal and coke) to $38,274,893 against $66,803,403 of placer gold, and $31,451,956 lode gold. The amount of gold produced from all sources is, however, greater than that of any other mineral, amounting to $39,255,359. The mineral production of British Columbia for 1904 ($18,977,359) exceeded that of all other provinces of the Dominion combined ($18,565,381). The collieries are situated in Vancouver island and on the western slope of the Rockies, near Crow's Nest pass in the extreme south-east of the province. The Vancouver island collieries mined 1,023,013 tons of coal during the year, besides 19,371 tons of coke. Of the Vancouver island coal about 53 per cent. went to California. The Crow's Nest pass collieries mined 662,685 tons of coal, of which 118,188 tons were exported to the United States. The export of coke has increased from 27,758 tons in 1903 to 97,690 tons in 1904. The report includes an account of the mining status of each district, and is furnished with illustrations of mining places and operations.

The Ecuador Degree-measurement.—The latest report to the Academy of Sciences, by the French Committee controlling the scientific operations for the degree-measurement in Ecuador (*C.R.*, vol. **140**, p. 998), shows that the difficulties with which the observers have had to contend have shown no signs of lessening during the year under review, and that, as a result, the completion of the undertaking must once again be subject to an unforeseen delay. As in former years, the meteorological conditions have proved persistently adverse, the amount of fog prevailing in the upper region of the Andes rendering long sojourns at many of the stations necessary. Besides this, the presence of bubonic plague in Ecuador has further hampered operations, while several of the officers in charge have been invalided through fever and other illnesses. After summarizing the operations actually carried out in 1904, the report discusses the steps to be taken in view of the unexpected retardation of the work. In order to keep within the limits of the funds at present available, it would be necessary to curtail the operations in four different ways, viz. by shortening the length of the arc; substituting a less precise method for the measurement of the southern base; omitting the pendulum observations; and giving up the extension to Machala on the coast. The reporter points out the grave defects by which the results would be impaired if these curtailments of the original plan were decided on, one important requirement—viz. the testing of the possible effect on the form of the geoid exercised by the attraction of the Andes—being thereby left unfulfilled. It is therefore urged that the idea of such an abbreviation should not be entertained, but that every effort should be made to carry out the undertaking in its entirety. It is thought that, even allowing for continued causes of delay, the whole should be completed by May, 1906.

AUSTRALASIA AND PACIFIC ISLANDS.

Captain Barclay's Exploration in Central Australia.—An expedition under Captain Barclay and Mr. Macpherson has lately traversed some hitherto unknown country to the north of Lake Eyre, the main objects being (1) to explore the country and endeavour to find a stock-route from Mandoora to Queensland; (2) to make a survey of a square mile of sandhill country for scientific purposes; (3) to search for possible traces of Leichardt and his companions. The explorers undertook the journey at their own expense, though the use of six camels was granted by the Government. Captain Barclay, who lately gave an account of his trip before the South Australian branch of the R.G.S. of Australasia, described the country traversed as hopeless, lifeless desert, the only vegetation being spinifex. It was a dreary journey, with water scarce and scanty, and for eight days nothing but sandhills were seen on either side. A visit was paid to the splendid Anacoola bore, which has a discharge of 700,000 gallons per day, but such is the thirsty nature of the sand that the greater part is at once sucked up. It is a singular fact that bulrushes at once spring up round these artesian bores, though they may not previously have existed anywhere in the vicinity. Rabbits were found to have infested the country in the neighbourhood of Todd river during the last few years, and proved useful for food. Going east, the explorers struck across to the Hale river, but in pushing further east fell into difficulties for want of water, and were forced to beat a retreat under a shade temperature of 114°. Many good photographs were taken, and the sandhill survey above alluded to was made, but in other respects the result of the journey was not encouraging, and, needless to say, no trace of the long-lost explorer was met with.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

The Ideal Topographical Map.—The following remarks were made by Mr. E. G. Ravenstein during the discussion on Major Close's paper on the above subject (*Journal*, vol. 25, p. 633 *et seq.*). Mr. Ravenstein said he had listened to the paper with pleasure. Much of what he should have liked to say had been said already. He thought it waste of money to spend a hundred pounds upon a specimen map. Specimen maps of all kinds might be had for a few shillings, and he thought that a collection of such maps, carefully selected, and representing all styles and scales, would prove both interesting and instructive. Among the maps now exhibited he missed some of the finest maps produced abroad. Some twenty years ago a committee of the British Association, of which Generals Walker and Lefroy, Lord Kelvin, and others were members, and himself secretary, laid down certain propositions for producing a physical map of the British Islands on a scale of 1: 200,000. The sheets of the map were to be bounded by meridians and parallels, the features of the ground were to be shown by contours and fathom-lines referred to the datum level of the Ordnance Survey, as explained by him in a paper placed before the Society in 1886,* and since carried out by the Ordnance Survey. Up to 600 feet and down to 100 fathoms these contours were to be drawn at intervals of 100 feet, and in special cases even at smaller intervals. The intervals between the contours were to be tinted. Various schemes of colouring, varying with the nature of the ground, were proposed, and in one case the colours of the prism were employed with good effect. Specimen maps, prepared by him, were to have been published, but, the expense proving too great, the intention was abandoned, and the specimens drawn by him had gone astray. When he

* See *Proceedings, R.G.S.*, 1886, pp. 21–27.

suggested the execution of such a map to a publisher, he was promptly met with the objection that a physical map would not sell. He had succeeded, however, in securing the acceptance of a modified scheme for a map of England, and four sheets of that map had been shown at the Geographical Congress in 1895, and were now exhibited on a screen in the room. Private publishers, who were bound to look for a profit, had not only to compete with public departments, like the Ordnance Survey Office, with whom profit was quite a secondary consideration; they had likewise to reckon with the want of appreciation of good maps on the part of the public. The public needed educating in the use of maps. He had never seen a cabman with a map, and if a dispute about a fare were brought before a Police-magistrate, the latter did not call for a sixpenny plan to measure the distance, but ordered two men out with a perambulator to measure the distance on the ground. Eventually the complainant or defendant had to bear the expense of this absurd proceeding, an expense which, in most cases, they might have avoided had they themselves consulted a map. He thought Mr. Freshfield would agree with him when he asserted that foreign tourists readily paid five shillings for a good map, whereas English tourists grudged the payment of sixpence. He thought classes or educational lectures on the use of maps, to which magistrates, cabmen, and other ignorant persons could be invited, might be organized with advantage. Once the public had been taught to appreciate good maps, the inferior article which now flooded the country would become unsaleable.

OBITUARY.

William Thomas Blanford, C.I.E., LL.D., F.R.S.

No name is perhaps more intimately connected with scientific progress in India during the last fifty years than that of Blanford—a name which future geologists, geographers, and naturalists will ever revere as they go over ground first studied by the two brothers, or when extending their researches among families of the rich and interesting fauna of our Indian Empire. Henry Blanford's loss we had to deplore some years ago (in 1893), now it is our sad duty to record that of the talented elder brother, William. Both men had a similar training at the School of Mines, Jermyn Street; both owe their scientific path through life, as they were proud to say, to a very clever mother, who fostered their early tastes for natural history, and led them to select the profession they afterwards filled so worthily. After a training under such masters as De la Beche, Lyon Playfair, Edward Forbes, Ramsay, and Warington Smyth, it is not surprising that William Blanford (who must now be more particularly referred to) went out to India in 1855, for duty on the Geological Survey under Dr. Thomas Oldham, with a mind well equipped for the work before him, with a broad, deep insight into geology, and a power of thought which enabled him to grasp and unravel the geological structure of peninsular India, at that time quite unknown. The publications of the Indian Geological Survey bear witness to the vast amount of this work, how well it was done, and how many years were devoted to it. After this splendid training in the field, next followed his appointment, in 1867, as geologist with the Abyssinian expedition to Magdala. It was a most fortunate selection, and the results were of great value. In 1872 he was again on special duty with the Boundary Commission in Persia, under Major St. John, R.E., where the geology and natural history as usual were excellently done. William Blanford's accomplishments did not end with geology. His love of natural history led him from the first to collect assiduously in many

branches; thus, while his survey duties took him through the jungles of Southern India, the deserts of Sind, or the forests of Sikkim, mammals, birds, reptiles, and land mollusca all came under his keen observation, and were largely collected, so that his mind was a perfect store-house concerning their distribution, their habits, and specific differences. It was owing to this that there is so much that rivets attention in many of his writings, that blending of the geological past with the present world. The distribution of species was his strong point, shown in such papers as the "African Element in the Fauna of India," and many others. Dr. Blanford's most important work, in concert with H. B. Medlicott of the Geological Survey, was, no doubt, the 'Manual of the Geology of India,' which is a monument to both, and particularly to Blanford, who had the largest share in its preparation. It treats of the whole known parts of India, both Peninsular, the Himalayas, Assam, Burmah, etc., compiled from every available source, and brought up to date, a standard work from which all future investigation starts. To quote Prof. Henry Woodward: "His work in every department, whether in zoology, geography, or geology, has been marked by thoroughness, and accuracy," and the major part of it has stood the test of time.

Shortly after the appearance of the 'Manual,' he was compelled by ill health to resign the service of the Indian Government, but, on returning to a less trying climate, was, fortunately, able to commence another career as lengthy and important as the one in India.

From the first Blanford's tastes had led him more towards zoology than geology, and on his retirement this bent became more marked. At his suggestion, the Government of India undertook the publication of a comprehensive account of the fauna of British India, the whole of which was edited by him, and to which he contributed the volume on the mammalia and two volumes on birds. The principal part of his energies during the last five and twenty years of his life was, however, devoted to the service and administration of the scientific societies in which he was interested. As a member of the Royal Geographical Society his services to geography were of the highest order, and for years he was a frequent speaker at the evening meetings—his remarks having a special value as the result of a sound knowledge of the subject on hand. Most frequently these remarks entered the domain of physical geography, with which few men living were better able to deal. It is hardly necessary to add that he served on the Council for years, and became one of the Vice-Presidents. As president of the Geological, vice-president of the Royal and Zoological Societies, as treasurer and councillor of these and other societies, and as the trusted adviser of the Indian Office on matters connected with the sciences of which he was a master, his services were as valuable, and perhaps as lasting in their results, as his published works, and have ever been cordially recognized by his fellow-workers.

Space will not permit an enumeration of the many addresses and papers—some 175 in all—published by Blanford, but special mention must be made of his works on the geology and zoology of Abyssinia, and on the zoology and geology of Persia—still standard works on the countries they deal with. Particularly valuable from the geographical standpoint are his often-quoted description of the deserts of eastern Persia and his account of the origin of their surface features; while many of his geological papers contributed greatly to a knowledge of the physical geography of India. Thus his paper on the Indian desert, published by the Asiatic Society of Bengal in 1876, is a model of geographical research from the physical side. But for details of his life and writings, readers of the *Journal* may be referred to an excellent memoir written by Prof. Henry Woodward for the *Geological Magazine* of January, 1905.

For several years past his time had been principally occupied in editing 'The Fauna of India.' Besides compiling the volumes on the mammalia and birds, already referred to, he had begun work on the first volume of the land mollusca, and it may truly be said he died in harness. Even so recently as June 7 and 8 he was occupied with correspondence on this subject; then came the short illness, and he passed away on June 23, science losing one of her best and ablest sons. There is no doubt the hours he spent going over proofs of the 'Fauna' was a severe strain at his age; it kept him in when he should have been taking exercise out-of-doors. It had been evident to his many friends that his health was failing, yet he always picked up after a few days in the country, which shows that if he had not worked so hard his life would have been longer. Blanford was elected a Fellow of the Royal Society in 1874. Among other honours, he received the Wollaston Medal of the Geological Society and a Royal Medal of the Royal Society, and for his Indian services he was only quite recently made a Companion of the Order of the Indian Empire.

Blanford possessed a charm of manner not often met with: quiet and unassuming, ready to impart his knowledge to all, interesting and leading others to follow his footsteps in the studies he had made his own.

Colonel Sir John Farquharson, K.C.B.

We deeply regret to have to record the death of Colonel Sir John Farquharson, K.C.B., late Director-General of the Ordnance Survey, which occurred in Edinburgh early in July, at the comparatively early age of sixty-six years.

John Cosmo Macpherson was born on March 18, 1839, and was educated at Marischal College, Aberdeen, and at the Royal Military Academy, Woolwich. He obtained his first commission in the Royal Engineers on June 22, 1859. He joined the Ordnance Survey on July 1, 1872, and served on it as a Division officer till December 6, 1878, during which period he obtained a very intimate knowledge of the field work of the Survey, especially in the Highlands of Scotland. He rejoined the Ordnance Survey on September 1, 1882. In 1885 he served as Commissioner on the Boundary Commission in connection with the Redistribution Bill of that year.

In November, 1887, Lieut.-Colonel Macpherson was appointed Executive Officer of the Ordnance Survey, and held that post till his appointment as Director-General in March, 1894. In 1888 he was permitted to assume the name of John Farquharson.

Colonel J. Farquharson was retired from the army in 1896, on attaining the age of fifty-seven, being at the time a substantive colonel; but in view of the value of his services he was retained in his post as Director-General and Officer commanding the Survey companies till 1899. He was made a C.B. in 1890, for work in connection with the completion of the Cadastral Survey, and in 1899 he was made a K.C.B., on vacating the post of Director-General of the Ordnance Survey. Last year he was appointed to serve on a committee on the Survey of India, and threw himself into the work with his accustomed energy and thoroughness. On his return last May, his friends were distressed to see how ill he was. He never recovered, and died in Edinburgh on July 3.

Sir John Farquharson was a man of great ability, force of character, and energy. The prevailing characteristic of his work was thoroughness. He would probably have made his mark in any line of life. He wrote ably on military subjects, and, if he had had the good fortune to see active service, would probably have made a

reputation as a soldier; but it was as one of the ablest of the heads of the Ordnance Survey that he is best known. It was during his tenure of office that the revision of the Ordnance Survey was started. The revision entailed a drastic change in the arrangements of the Survey, and many important questions had to be settled. His intimate knowledge of the work, his industry and thoroughness and sound judgment, enabled him to carry through the requisite changes smoothly and well. During his time increased attention was paid to the small-scale maps of the Ordnance Survey, which had for some years suffered owing to the pressure for the completion of the large-scale maps; and it is to him we owe the one-inch coloured map, which many consider one of the best of the Ordnance Survey maps.

Sir John Farquharson was a fellow of the R.G.S., and served for some years on the Council. He always maintained a keen interest in the work of the Society.

DUNCAN A. JOHNSTON.

Sir Augustus Charles Gregory, K.C.M.G.

One of the last remaining representatives of the early generation of Australian explorers, whose venturesome pioneer journeys did so much to reveal the general features of the interior of the continent during the middle decades of the last century, has passed away in the person of Sir Augustus Gregory, one of the three brothers who all did their part in making known to the world the districts lying behind the coast settlements of Western and Northern Australia. Sir Augustus was one of the best type of British explorers, combining qualities which eminently fitted him for the arduous tasks which he undertook, with a singular modesty and simplicity of character, which led him never to magnify his achievements or push himself forward as a claimant for public notice, however much those who knew him best might recognize the sterling quality of his work.

It is now close upon sixty years since Augustus Gregory first came forward as a pioneer in the opening up of the back country of Western Australia, where, though born in this country, the greater part of his early life had been spent. His father, Captain Joshua Gregory, of the 78th Highlanders (Rossshire Buffs) had been wounded at El Hamed, in Egypt, and forced to retire from active service, receiving in lieu of pension a large grant of land in the new settlement on the Swan river. Thither he went out, with his wife and five sons, in June, 1829, taking passage in the second passenger ship that ever sailed to that remote corner of the British dominions. Augustus, who had been born in 1819, in Nottinghamshire, was the second son, the two brothers who afterwards joined him in his first expedition—Francis and Henry—coming third and fourth in order. It was at quite an early age that the natural bent for surveying, which was afterwards developed to such good purpose, manifested itself in the laying down the boundary of the family property, which adjoined that of the surveyor-general. There was naturally much work of the kind to be done, and Gregory soon obtained employment in the survey department under the Imperial Government, gaining invaluable experience during five years spent in this service. The first real exploring work was done in 1846, when, having applied for leave of absence for the purpose of making an attempt to penetrate the difficult interior country which had baffled so many of his predecessors, Gregory obtained official sanction for his venture, in which he was joined by the two brothers above mentioned. Pushing on through the most inhospitable country, the brothers for the first time reached the borders of the Coolgardie district, noting that the geological formation was such as to lead to the expectation that gold might occur. The first West Australian coal was also found in the bed of the Irwin river.

Two years later Gregory led a party (sometimes known as the "Settlers' Expedition") for the purpose of searching for new districts suitable for stock in the north of the colony. The difficulties were no slight ones, as the prospectors were accompanied by their animals, while water was often scarce. Some good grazing country was, however, discovered. Later in the same year (1848) Gregory accompanied Governor Fitzgerald on a visit to the Geraldine lead-mine, and by his conduct during a brush with the natives (in which the governor was wounded) made a most favourable impression on the latter, which helped him in his future work. In 1854, when the idea of an exploration of the northern interior was engaging the attention of the home authorities, Gregory was specially named by the Duke of Newcastle, then Secretary for the Colonies, for the command of the party. The expedition, which set out in 1855, was the most important which he carried out, and will always be remembered as the first to shed light on the geography of the previously unknown interior of the northern territory. Starting from the mouth of the Victoria river, the party ascended this river to its source, crossing the watershed to the southward-flowing Sturt creek, and then making its way to the Gulf of Carpentaria, and across the northern peninsula to the east coast, shedding much new light on the rivers of this region, and discovering the water-parting formed by the Newcastle ranges. For his achievements on this expedition, Gregory received, in 1857, the Founder's Medal of the R.G.S.

Shortly after this Gregory was placed in charge of the Leichardt search expedition, which started from New South Wales, and followed down the Barcoo into Cooper's Creek, finally emerging at Adelaide just when anxiety was beginning to be felt for the safety of his party. On his return he took a prominent part in defining the southern boundary of Queensland, then just separated from New South Wales, and became Surveyor-General for the new colony, a post which he held for twenty years. The remainder of his career was connected with this colony, under whose government he held various posts, earning the respect and affection of all with whom he came in contact. He took a keen interest in scientific work of all kinds, and in 1895 held office as President of the Australian Association for the Advancement of Science, devoting his opening address to a sketch of the geological and geographical history of Australia. He was made K.C.M.G. in 1903.

Hermann von Wissmann.

On Friday, June 16, there died at his estate of Weissenbach, near Liezen in Styria, in consequence of a gun accident whilst out deer-stalking, Major von Wissmann, one of the most famed pioneer-explorers of tropical Africa.

Wissmann was born at Frankfurt on the Oder on September 4, 1853, the son of a Government official. He chose a military career. Having attended the school for cadets at Berlin, in 1871 he joined the 90th Fusiliers, and, after a further course of instruction at the military college at Anklam, was granted a commission as officer in January, 1874.

At Rostock, where his regiment was stationed, he became acquainted with Dr. Paul Pogge, and when the German African Association decided to send an expedition into inner Africa under the leadership of that experienced African traveller, in 1880, Wissmann was selected to be his companion. The expedition left Loanda in January, 1881, crossed the Kwango and the upper Kasai, and reached Nyangwe on the upper Congo on April 16, 1882. Dr. Pogge then turned back to the west,* but Wissmann went forward to the east, crossed the Tanganyika

* He died at Loanda, March 17, 1884.

to Ujiji, made his first acquaintance with Tipo Tib, the Arab slave-dealer, at Tabora, and reached Saadani, on the east coast, on November 15, 1882, the first German who had crossed tropical Africa from coast to coast.*

The success achieved attracted the attention of the King of the Belgians, at whose instance Wissmann undertook the conduct of an expedition, the main object of which was the exploration of the Kasai. Accompanied by Dr. L. Wolf, Lieut. Curt von François, and five other Europeans, among whom was a ship's carpenter, Wissmann left Hamburg on November 16, 1883, and proceeded by way of Loanda and Malanje, to the country of the Bashilange, where he founded the station of Luluaburg. Ten boats having been built there, the expedition started on May 28, traced the Kasai to its confluence with the Congo, and on July 16, 1885, arrived at Leopoldville, where it met with a hearty reception at the hands of Sir Francis de Winton, the governor of the Congo State.†

After a few months' rest in the congenial climate of Madeira, necessitated by the state of his health, Wissmann returned to the Congo in January, 1886, reached Luluaburg by way of the Kasai, left that place on November 16 with Lieut. Paul le Marinel and a caravan of 900 men, and once more arrived at Nyangwe on February 15, 1887. It was his intention to work his way northward towards the region occupied by Emin Pasha, but the disturbed state of the country, and the hostile attitude of the Arabs, who detained him for three months, compelled him to abandon this plan, and to travel to the east coast by way of Tanganyika, the Stevenson road, and the Shire. On August 8, 1887, he arrived at Kilimani, and when he passed through Zanzibar, homeward bound, he "gave himself up entirely to joy at the successful results of the German spirit of enterprise."‡

Wissmann spent the winter of 1887–88 at Madeira. Meantime the Royal Geographical Society awarded him the Patron's Medal "in recognition of his great achievements as an explorer of Central Africa, and especially for the arduous and adventurous journey in which he traced the river Kasai from its upper waters to its previously unknown junction with the Congo."§

On June 25, 1888, during a visit to England, he read a paper before our Society, "On the Influence of Arab Traders in Western Central Africa."‖ At that time he was full of ardour to continue his work in Africa in the service of science and civilization, and he told the writer of this obituary that he intended to throw up his commission in the Prussian army, as after the stirring life he had led it would be impossible for him to submit to the drudgery of drilling recruits from year's end to year's end.

This resolution he never carried out, for soon after his return to Germany he was induced to associate himself with Dr. Carl Peters for the alleged purpose of bringing relief to Emin Pasha.¶ Fortunately for his reputation, he retired from this enterprise when, on February 8, 1889, Prince Bismarck, who highly valued his abilities, appointed him Imperial Commissioner, and allotted him the task

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* 'Unter deutscher Flagge quer durch Afrika.' Berlin: 1888.

† 'Im Innern Afrikas: die Erforschung des Kassai. Von Wissmann, Wolf, François, u. Mueller.' Leipzig: 1888.

‡ 'Meine zweite Durchquerung Aequatorial-Afrikas, 1886–7.' Frankfurt a. d. O.: 1898. An English translation of this work appeared in 1891, under the title of 'My Second Journey through Equatorial Africa.'

§ *Proceedings of the Royal Geographical Society*, 10, 1888, pp. 300, 467, 537.

‖ Ibid., p. 325.

¶ Dr. Peters, in spite of the blockade of the coast, managed to land his expedition at Kwyho on June 15, 1889.

of quelling an insurrection, headed by the Arabs, which had broken out in August, 1888, immediately the officials of the German East African Company attempted to take possession of the coast-line conceded to it by the Sultan of Zanzibar. Wissmann set about this task with his accustomed energy and discretion. When he arrived at Zanzibar on March 31, 1889, the only coast towns still held by the Germans were Bagamoyo and Dar es Salam. Backed by a native force of about a thousand Sudanese and other natives commanded by German officers and non-commissioned officers, and supported by the navy, he reoccupied Saadani and Pangani in June and Tanga in July. He then reopened the caravan route to Mpwapwa, and on September 9 reoccupied that station, at which Stanley and Emin, coming from the interior, arrived on November 10. On November 4, Bushiri, the cruel leader of the rebellion, fell into his hands, and was executed, whilst Bwana Heri, next to Bushiri the most important leader of the Arabs, voluntarily surrendered on April 3, 1890. Having thus recovered possession of the whole northern section of the protectorate, Wissmann in the course of May recovered Kilwa and the other southern ports, and on the 26th of the month left Zanzibar for Europe. At Berlin he met with a most enthusiastic reception. The Emperor, in recognition of the great services rendered by him to the cause of German colonization, ennobled him, and promoted him to the rank of major, whilst the University of Rostock conferred upon him the honorary degree of D.Ph. After spending several months with his aged mother at Lauterberg, in the Harz, he once more returned to Africa in November. In the year following he led a punitive expedition against Sina of Kibosho, on Kilimanjaro. On April 1, 1891, the term for which he had been appointed expired, but it was hoped that he would have been appointed "governor" of the colony which had so much benefited by his activity; but this was not to be. His friend Bismarck was no longer in office, and General Caprivi appointed in his stead, first Baron Soden, during whose rule, in August, 1891, a German military force was annihilated by the Wahehe; and secondly, Baron Schele. Wissmann, taking no heed of the slight put upon him, continued in the colonial service in a subordinate position. Having, some years before, pointed out to the German Anti-slavery Committee that the most effective way of stopping the slave trade consisted in building inland stations and placing steamers upon the lakes, he undertook to convey a steamer, provided by a public subscription, to one of these. Originally intended for the Victoria Nyanza, it ultimately found its way to Lake Nyasa. Whilst Captain Prager was busy at Mpimbi piecing together the steamer, Wissmann went north, founded the station of Langenburg, and cleared the country between Nyasa and Tanganyika of slave-hunters. The steamer was launched on January 12, 1893, and, having been fitted with engines at Port Maguire, arrived at Langenburg on September 21, and has been doing excellent service ever since. Wissmann's health having broken down, he left Africa once more in December.*

The last act in Wissmann's African life opened in May, 1895, with his appointment as Governor of German East Africa. When he landed at Dar es Salam on July 24, he was acclaimed as a friend by natives and Arabs, whilst the military and naval authorities, who had received his predecessors with much ostentation, stood strangely aloof. On assuming office, he declared that he should do his utmost to develop the natural resources of the colony, to raise the natives to a

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* There are at present three German steamers on the lakes, viz. the *Hermann Wissmann* on Lake Nyasa; an aluminium steam-pinnace on the Victoria Nyanza, since April, 1900; and the *Hedwig von Wissmann* on Tanganyika, since the spring of 1901.

higher plane of civilization, and to promote scientific research; bureaucratic methods would be discarded. It is worth noting that Wissmann did not believe in the colonization of tropical Africa by agricultural colonists, but thought that native labour under European supervision would yield satisfactory results. Having held this honourable office for little more than a year, Wissmann, owing to the state of his health, finally retired from public life. He was only rarely heard of since, and spent the remainder of his days at an estate which he had bought in Styria, and there he died, leaving a widow and four children to mourn his loss.

Wissmann was of a genial, cheerful disposition, candid and outspoken, generous, and at all times ready to recognize the merits even of his rivals. In the management of public affairs he showed much judgment, and never abused the power with which he was entrusted. In dealing with the natives he was ever conciliatory and accessible, and thus won their good-will and even love. Unfortunately, his constitution was none of the strongest; his health broke down repeatedly, and he was ultimately compelled to retire altogether from public life.

E. G. R.

Alexander Begg.

Mr. Alexander Begg, well known in British Columbia as a successful journalist and writer, as well as for his interest in crofter immigration, died in New York in March last, leaving a widow and eleven children. Mr. Begg was born in Caithnessshire in 1825, and went to Canada in 1846, eventually becoming inspector of inland revenue for the north-west. He also acted as emigration commissioner to Scotland for the Ontario Government. Mr. Begg was the author of a useful 'History of British Columbia.'

CORRESPONDENCE.

The Yun-nan Railway.

In the discussion which took place after Colonel Manifold's paper on the Upper Yangtze Provinces, given in the June number of the *Geographical Journal*, Sir George Scott made some criticisms on the way the preliminary reconnaissance for the Yun-nan railway was carried out. Time did not admit of a reply being made at the moment, so I hope you will allow me to answer his remarks here.

In the first place, Sir George Scott rather hints that the work was not carried out by properly qualified railway engineers. The survey party sent out by the Yun-nan Company included the late Captain W. A. Watts-Jones and Captain C. G. W. Hunter, both officers of the Royal Engineers who had made a special study of railways, and had had previous experience of reconnoitring for a line through difficult country.

Sir George Scott then represents both Captain Watts-Jones and myself as being in such a hurry to get to Ta-li Fu that we followed each other blindly along the same road, looking neither to the right nor to the left. As a matter of fact, we surveyed between us four or five different roads to Ta-li Fu, but we certainly did not start out with any fixed idea that the railway must pass through that place, for our proposed main line does not go to Ta-li Fu at all.

Sir George Scott then gives his views as to the direction that the line ought to

take. He suggests that we did not pay sufficient attention to the country lying east of the Nam Ting valley. I think, however, that a glance at the Survey of India sheets * on 4 miles to an inch, which give the results of our work, will show that this part of the country is particularly well filled in, while the more westerly part of it has, in addition, been triangulated and accurately surveyed by the Boundary Commission.

The line which he proposes is to "cross southwards from the Nam Ting to the Nam Hsung." This is not very intelligible, for the Nam Hsung lies *east* of the lower course of the Nam Ting. I can only suppose that he means to follow the Nam Ting up to about lat. 23° 45′ or higher, and then bend round southward, passing perhaps near Keng-ma (lat. 23° 32′, long. 99° 27′), and reaching the Nam Hsung at Möng-Hsung (lat. 23° 20′, long. 99° 30′). The range which divides the Nam Ting from the Nam Hsung has been crossed by our routes in three places, and has nowhere been found as low as 7000 feet. As the Nam Ting valley is here not much over 2000 feet, the difficulties of getting a railway from one valley to the other are likely to be considerable.

Even if this obstacle could be overcome, it is by no means to be taken for granted that by the Nam Hsung valley "the Mekong could be easily approached." The Nam Hsung throughout its course runs between steep hills, and railway construction down its banks is likely to be extremely difficult, for in Yun-nan the valleys of the big rivers, bounded as they are by steep hillsides very liable to slips, were found on the whole to be the worst lines for a railway to follow.

Having reached the Mekong, Sir George Scott proposes to take the line to Ching-tung Ting (lat. 24° 25′, long. 100° 55′), but he omits to mention that this place is not in the valley of the Mekong, but in that of the Black river, and that between these two valleys flows yet another river, the Wei-yuan Chiang, with ranges of hills 7000 to 8000 feet high on each side of it. If to avoid crossing these two ranges we take the line up the Mekong and round the source of the Wei-yuan Chiang, we are confronted first with the difficulties of construction up the steep-sided Mekong valley for more than 100 miles, and then with a range of hills between the Mekong and the Black river, marked with the height of 11,500 feet. Doubtless there are lower places in it than this, but as the Mekong is here at an elevation of only 3100 feet, and the Black river at 3850 feet, this range between them is likely to prove an insurmountable obstacle.

Even if a railway could be got to Ching-tung Ting, the difficulties are by no means over. Sir George Scott says that from here "there is no difficulty whatever in going north towards Ta-li Fu." One would imagine, from this description, that the line would lead up a level plain. So far from this being the case, there is a pass of 6800 feet between the valley of the Black river and that of the Red river in which lies Meng-hua Ting (lat. 25° 15′, long. 100° 23′), and another pass of 8800 feet between the Meng-hua Ting plain and the Ta-li Fu plain.

Another line from Ching-tung Ting that Sir George suggests is "to a point halfway between Ta-li and Yun-nan Fu." By this he probably means Yun-nan Hsien (lat. 25° 30′, long. 100° 35′). But this place is not in the valley of the Black river, but in that of the Red river, so that yet another high range of hills has to be crossed to reach it.

From here he goes on to say, "there is an easy approach to the Yangtze." It is quite true that a practicable line for a railway could probably be found from

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* The sheets which include this part of the country are: South-East Frontier Series, Sheets 4 N.E., 12 N.W.; North-East Frontier Series, Sheets 30 S.W., 31 N.W., 31 S.W. These are in the Society's Map Room.

Yun-nan Hsien, reaching the Yangtze near Chin-chiang-kai (lat. 26° 15′, long. 100° 40′). But it would be quite a mistake to suppose that in reaching the river here the object of the line would be accomplished. To make the terminus of the railway at this out-of-the-way spot, where the river is not navigable for boats, would be quite useless. It might be supposed from the map that it would be easy to carry the line down the Yangtze valley, but such is far from being the case. Nearly the whole course of this part of the river is through steep gorges, and no place of any importance is passed through till Sui Fu is reached, some 500 miles below. These 500 miles of extremely difficult construction through an absolutely unprofitable country would render such a line quite impracticable.

To compare with Sir George Scott's proposals, I will give shortly the line reconnoitred by Captain Watts-Jones as far as Yun-nan Hsien. It would follow up the Nam Ting from Kun-long, continuing northwards over a range (5600 feet) to Yun Chou (lat. 24° 25′, long. 100° 10′). From here down the Nan-chiao Ho to the Mekong, up this river for 30 miles, and then by an easy ascent up a small side stream past Kung-lang (lat. 24° 50′, long. 100° 20′) and over another watershed (7200 feet) to the Red river valley. Both the Black river and the Wei-yuan Chiang are avoided altogether by going round their sources.

Our reconnaissance of 1000 miles of railway was, owing to limits of time, necessarily imperfect, and criticism of it *based on further surveys of the country* would be most welcome. I am not rash enough to pronounce Sir George Scott's line impossible, but I do not think that he is justified in brushing on one side the work of the Yun-nan Company survey parties and describing his line as "the proper route."

The maps to which I have referred are sold by the Survey of India in Calcutta, but appear to be difficult to obtain in England. Probably Sir George Scott has not come across them, but I venture to think that if he can find time to study them, he will convince himself that the line he suggests is not such a simple matter as he supposes.

H. R. Davies, Major,
Oxfordshire Light Infantry.

London, June 13, 1905.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1904–1905.

Sixteenth Meeting, June 26, 1905.—Right Hon. Sir George T. Goldie, K.C.M.G., D.C.L., LL.D., F.R.S., President, in the Chair.

Elections:—*John Cecil Macrae (Indian Army, 43rd Erinpura Regt.); Lieut.-Colonel C. F. Minchin, D.S.O. (Indian Army); Maurice Hart Orr-Ewing; Lieut. A. S. Redman, R.E.; Charles Atmore Sherring; Reginald Campbell Thompson, M.A.; Sidney A. Tippetts, B.A.; John Claus Voss.*

The paper read was:—

"The French Antarctic Expedition." By Dr. Charcot.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Académie, Akademie.
Abh. = Abhandlungen.
Ann. = Annal , Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Col. = Colonies.
Com. = Commerce.
C. R. = Comptes Rendus.
E. = Erdkunde.
G. = Geography, Géographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
Jb. = Jahrbuch.
k. u. k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. (Mém.) = Memoirs, Mémoires.
Met. (mét.) = Meteorological, etc.
P. = Proceedings.
R. = Royal.
Rev. (Riv.) = Review, Revue, Rivista.
S. = Society, Société, Selskab.
Sc. = Science(s).
Sitzb. = Sitzungsbericht.
T. = Transactions.
Ts. = Tijdschrift, Tidskrift.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Greece. **Baedeker.**

Greece. Handbook for Travellers, by K. Baedeker. Third edition. Leipzig: K. Baedeker; London: Dulau & Co. 1905. Size 6½ × 4½, pp. cxxxiv. and 434. *Maps, Plans, and Panorama. Price* 8*m. Two copies, presented by the Publishers.*

Italy—Bibliography. *Riv. G. Italiana* 11 (1904): pp. 90. **Magistris.**

Bibliografia geografica della regione Italiana. Anno III. 1903. Rassegna di L. F. de Magistris.

Italy—Garda Lake. *Atti R.A. Lincei, Rendiconti* **14** (1) (1905): 90–92. **Teglio.**

Le sesse nel lago di Garda. Nota preliminare dell dott. E. Teglio.

Italy—Vesuvius. *C. Rd.* **140** (1905): 200–202. **Janssen.**

Sur une récente ascension au Vésuve. Note de J. Janssen.

Mediterranean—Cyprus. **Hutchinson and Cobham.**

A Handbook of Cyprus. Compiled by Sir J. T. Hutchinson and C. D. Cobham, C.M.G., 1905. London: E. Stanford, 1905. Size 7½ × 5, pp. xii. and 126. *Maps and Frontispiece. Price* 2*s.* 6*d. net. Presented by the Publisher.*

Norway. **Nansen.**

Norway and the Union with Sweden. By F. Nansen. London: Macmillan & Co., 1905. Size 7½ × 5, pp. vi. and 96. *Price* 2*s. net. Presented by the Publishers.*

A useful sketch of the history of the relations between Norway and Sweden.

Norway. *Z. Ges. Erdk. Berlin* (1905): 5–19. **Ebeling.**

Die Ergebnisse einer Studienreiser im Gebiet des Jostedalsbrae. Von Dr. M. Ebeling. *With Map and Illustrations.*

Russia. *Ann. Hydrographie* **33** (1905): 59–61. **Herrmann.**

Die russischen hydrographischen Forschungen im nördlichen Eismeere im Jahre 1903. Nach dem Bericht des Oberst F. Drishenko von J. Herrmann.

Largely taken up with an historical sketch of the progress of exploration from the time of Peter the Great.

Russia—Finland. **Heinrichs.**

Observations météorologiques publiées par l'Institut Météorologique Central de la

Société des Sciences de Finlande. État des glaces et des neiges en Finlande pendant l'hiver 1893–1894 exposé par A. Heinrichs. Helsingfors, 1904. Size 13½ × 10½, pp. 60. *Maps.*

Russia—Kanin Peninsula. *Zap. Imp. Russ. G.S.* **41**, No. 1 (1904): pp. 310. ——

Rapports de l'Expédition de la Société Impériale Russe de Géographie à travers la Péninsule Kanin en 1902. [In Russian.] *With Maps and Plates.*

Russia—Ural. *C. Rd.* **140** (1905): 333–335. **Duparc and Pearce.**

Sur l'existence de hautes terrasses dans l'Oural du Nord. Note de L. Duparc et F. Pearce.

Spain—Cartography. *Ann. G.* **13** (1904): 401–419. **Prudent.**

La cartographie de l'Espagne. Par le Lieut.-Colonel F. Prudent.

Sweden. *Petermanns M.* **51** (1905): 45–47. **Sieger.**

Zur Siedelungsgeographie Schwedens. Von Prof. Dr. R. Sieger.

Sweden—Cartography. *Ymer* **24** (1904): 341–363. **Melander.**

Norrlandskartan och Rikets allmänna Kartverk. Af E. Melander. *With Index Map.*

Sweden—Cartography. *Ymer* **24** (1904): 400–406. **Svenonius.**

Den nya Norrbottenskartan, med särskildt afseende på ortnamnens stafning. Af F. Svenonius.

Switzerland. *Questions Dipl.* **19** (1905): 288–292. **Lambin.**

Le Simplon et la défense commerciale de Marseille. Par C^{te}. H. Lambin.

Turkey. **Gelzer.**

Vom Heiligen Berge und aus Makedonien. Reisebilder aus den Athosklöstern und dem Insurrektionsgebiet. Von H. Gelzer. Leipzig: B. G. Teubner, 1904. Size 8 × 5½, pp. xii. and 262. *Map and Illustrations. Presented by the Publisher.*

United Kingdom. *Quarterly J. Geolog. S.* **61** (1905): 64–96. **Woolacott.**

The Superficial Deposits and Pre-Glacial Valleys of the Northumberland and Durham Coalfield. By D. Woolacott. *Maps and Illustrations.*

United Kingdom—Ireland. **Joyce.**

A Social History of Ancient Ireland, treating of the Government, Military System, and Law; Religion, Learning, and Art; Trades, Industries, and Commerce; Manners, Customs, and Domestic Life, of the Ancient Irish People. By P. W. Joyce. 2 vols. London: Longmans & Co., 1903. Size 9 × 6, pp. (vol. 1) xxiv. and 632; (vol. 2) xii. and 652. *Maps and Illustrations. Price* 21*s. net.*

The most valuable work on the subject that has appeared, and of much interest to the student of human geography.

United Kingdom—Ireland. *English Hist. Rev.* **20** (1905): 309–337. **Dunlop.**

Sixteenth-Century Maps of Ireland. By R. Dunlop.

United Kingdom—Ireland. *P.R. Irish A.* **25** (1905): 1–5. **Ussher.**

On the discovery of Hyæna, Mammoth, and other extinct mammals in a Carboniferous cavern in County Cork. By R. J. Ussher.

United Kingdom—Scotland. **Clough and Harker.**

Memoirs of the Geological Survey. Scotland. The Geology of West-Central Skye, with Soay. Explanation of sheet 70. By C. T. Clough and A. Harker. Glasgow; London: E. Stanford, 1904. Size 10 × 6, pp. 60. *Illustrations. Price* 1*s. Presented by the Geological Survey.*

United Kingdom—Scotland. **Kilgour.**

Twenty Years on Ben Nevis. Being a Brief Account of the Life, Work, and Experiences of the Observers at the highest Meteorological Station in the British Isles. By W. T. Kilgour. Paisley: A. Gardner, [1905]. Size 7½ × 5, pp. 154. *Map and Illustrations. Price* 1*s.* 6*d. net. Presented by the Publisher.*

See note, *ante*, p. 208.

ASIA.

Central Asia. **Pumpelly.**

Explorations in Turkestan, with an account of the Basin of Eastern Persia and Sistan. Expedition of 1903, under the Direction of R. Pumpelly. Washington: Carnegie Institution, 1905. Size 12 × 9½, pp. xii. and 324. *Maps and Illustrations. Presented by the Carnegie Institution of Washington.* [To be reviewed.]

China. *B.S.G. Com. Paris* **27** (1905): 144–176. **Foy.**

A travers la Chine. Par M. Foy.

Discusses the economic development of China, especially by railways.

Eastern Asia. **Challaye.**

F. Challaye. Au Japon et en Extrême-Orient. Paris: A. Colin, 1905. Size 7½ × 5, pp. iv. and 270. *Price* 3.50 *fr. Presented by the Publisher.*

Includes an account of a trip into the country of the Mois in Indo-China. Other chapters deal with Java, India, and Ceylon.

Eastern Asia. **Ireland.**

The Far Eastern Tropics, Studies in the Administration of Tropical Dependencies. Hong Kong, British North Borneo, Sarawak, Burma, the Federated Malay States, the Straits Settlements, French Indo-China, Java, the Philippine Islands. By A. Ireland. London: A. Constable & Co., 1905. Size 8½ × 5½, pp. x. and 340. *Map. Price* 7*s.* 6*d. net. Presented by the Publishers.* [To be reviewed.]

India—Nepal. **Lévi.**

Le Népal. Étude historique d'un Royaume Hindou. Par S. Lévi. Vol. 1. (Annales du Musée Guimet. Bibliotheque d'Études. Tome xvii.) Paris: E. Leroux, 1905. Size 10 × 6½, pp. 394. *Plates. Price* 10*s.*

Includes a geographical chapter and others on the inhabitants, the political organization, etc., etc.

Malay Archipelago—Java. **Kern.**

Bijd. Taal-, Land- en Volkenk. Ned.-Indië **4** (1905): 364–367.

Iabadioe. Door H. Kern.

Explanation of the form "Iabadiu" of Ptolemy, and variants of the same name.

Malay Archipelago—Saparua. ———

Ts. K. Ned. Aard. Genoots. Amsterdam **22** (1905): 374–376.

Bij de Kaart van Saparoea. Door *Red. With Map.*

Saparua is one of the islands south of Ceram and east of Amboina.

Malay Archipelago—Sumatra. **Helb.**

Tijds. K. Ned. Aard. Genoots. Amsterdam **22** (1905): 372–373.

De Topographische opneming en Kaarteering van Zuid-Sumatra. Door H. Helb.

Persia. *Petermanns M.* **51** (1905): 4–12, 31–35. **Stahl.**

Reisen in Zentral- und Westpersien. Von A. F. Stahl. *With Maps.*

Russia—Caucasus. **Hoffmann.**

Die deutschen Kolonien in Transkaukasien. Von P. Hoffmann. Berlin: D. Reimer (E. Vohsen), 1905. Size 9½ × 6½, pp. x. and 292. *Maps and Portrait. Price* 6*s.*

The author, who is an agricultural expert, made a special study of the German colonies in the Caucasus during two visits to that region, as forming the part of the community which has made the most advance in agriculture. He gives interesting details respecting the history of the German emigration, which took place originally from Württemberg, early in the nineteenth century, from motives connected with religion.

Siam. ———

Siam. General Report on the Operations of the Royal Survey Department, Season 1902–1903. Bangkok, 1904. Size 13½ × 8½, pp. 62. *Maps, Plans, and Illustration. Presented by the Royal Survey Department, Bangkok.*

Turkey. *B.S.G. Com. Paris* **27** (1905): 49–57. **Favette.**

Voies régionales de la Turquie d'Asie. Débouché occidental du Transasiatique russe. Par D. Favette.

Turkey—Palestine. **Lees.**

Village Life in Palestine. A description of the religion, home life, manners, customs, characteristics, and superstitions of the peasants of the Holy Land, with reference to the Bible. By the Rev. G. Robinson Lees. New edition. London: Longmans & Co., 1905. Size 8 × 5½, pp. x. and 236. *Illustrations. Price* 3*s.* 6*d. net. Presented by the Publishers.*

In this edition the book has been entirely re-written. The descriptions and illustrations give a vivid idea of the life of the people of Palestine at the present day.

Turkey—Syria. *Le Globe, B.S.G. Genève* **44** (1905): 31–60. **Galichon.**

A travers le Hauran et chez les Druses. Par Mme. A. Sargenton Galichon.

AFRICA.

Africa—Railways. **Renty.**

Les Chemins de Fer coloniaux en Afrique. Troisième partie. Chemins de Fer dans les Colonies Françaises. Par E. de Renty. Paris: F. R. de Rudeval, 1905. Size 7½ × 5, pp. xii. and 496. *Maps. Price* 5 *fr. Presented by the Publisher.*

The most complete account of French African railway undertakings that has yet appeared.

British East Africa. **Linton and Brand.**

Africa. No. 2 (1905). Report on the possibilities of Cotton-growing in the East Africa Protectorate for 1904. London: Wyman & Sons, 1905. Size 13½ × 8½, pp. 18. *Price* 2½*d.*

Cape Colony—Geology. **Rogers.**

An Introduction to the Geology of Cape Colony. By A. W. Rogers. With a Chapter on the Fossil Reptiles of the Karroo Formation by Prof. R. Broom, M.D. London: Longmans & Co., 1905. Size 8 × 5½, pp. xviii. and 464. *Map and Illustrations. Price* 9*s. net. Presented by the Publishers.* [To be reviewed.]

Central Africa. **Fisher.**

On the Borders of Pigmy Land. By Ruth B. Fisher. London: Marshall Bros. [1905]. Size 9 × 6, pp. x. and 216. *Illustrations. Price* 3*s.* 6*d. net. Presented by the Publishers.* [See p. 212, *ante*.]

East Africa. ——

Handbook for East Africa, Uganda, and Zanzibar, 1905. Mombasa. Size 7½ × 5, pp. 256. *Map. Presented by the Editor.*

Kamerun. *M. Deutsch. Schutzgeb.* **16** (1903): 245–252. **Moisel.**

Begleitworte zu der Karte "Der mittlere Teil von Kamerun zwischen Sanaga und dem 8. Grade nördlicher Breite." Von M. Moisel. *Map.*

The map (scale 1 : 1,000,000) is based on a number of hitherto unpublished surveys.

Kamerun. *Deutsch. Kolonialblatt* **16** (1905): 81–88, 115–119. **Stieber.**

Bericht des Hauptmanns und Residenten von Kusseri, Stieber, über seine Reise in das Gebiet der Musgus.

Cf. note in Monthly Record for May (p. 567).

Madagascar. *Rev. Madagascar* **3** (1901): 457–472. ——

La route de l'Ouest et la mission du Capitaine Mauriès. Par M.R.S.

Madagascar. *Rev. Madagascar* **5** (1) (1903): 481–491; **5** (2) (1903): 3–14. **Ferrand.**

Les Tribus Musulmanes du Sud-Est de Madagascar. Par G. Ferrand.

Madagascar. **You.**

André You. Madagascar. Histoire, Organisation, Colonisation. Préface de M. Albert Decrais. Introduction de M. le Général Gallieni. Paris and Nancy: Berger-Levrault et Cie., 1905. Size 9 × 6, pp. xvi. and 636. *Map. Price* 10*s.*

A useful compendium of information.

Madagascar and Reunion. *C. Rd.* **140** (1905): 639–642. **Driencourt.**

Sur la détermination par transport de temps des différences de longitude à Madagascar et à la Réunion. Note de M. Driencourt.

Morocco. *C. Rd.* **140** (1905): 395–397. **Brives.**

Sur les terrains éocènes dans le Maroc occidental. Note de A. Brives.

Morocco. *Renseign. Col., Com. l'Afrique Française* (1905): 92–100. **Brives.**

Aperçu géologique et agricole sur le Maroc occidental. Par A. Brives. *With Map.*

Morocco. *C. Rd.* **140** (1905): 393–394. **Lemoine.**

Sur la constitution du Djebel Hadid (Maroc occidental). Note de P. Lemoine.

Morocco. *C. Rd.* **140** (1905): 690–692. **Lemoine.**

Sur une coupe géologique du Haut-Atlas, dans la région du Glaoui (Maroc). Note de P. Lemoine.

Morocco. *Archiv. Marocaines* **2** (No. II.) (1904): pp. 228. **Michaux-Bellaire and Salmon.**

El-Oçar el-Kebir: Une ville de province au Maroc Septentrional. Par E. Michaux-Bellaire et G. Salmon. *With Map and Illustrations.*

Nile. *Globus* **87** (1905): 69–72. **Herrmann.**

Die letzten Fragen des Nilquellenproblems. Von Hauptmann a. D. Herrmann. *With Map. Also separate copy.*

Nile. *J.S. Arts* **53** (1905): 274–284. **Preece.**

The Navigation of the Nile. By Sir W. H. Preece, K.C.B., F.R.S. *With Map.*

North and West Africa. **Marin.**

Algérie, Sahara, Soudan. Vie, Travaux, Voyages de Mgr. Hacquard des Pères Blancs (1860–1901) d'après sa correspondance. Par l'Abbé Marin. Avec une Préface du Commandant Hourst. Paris & Nancy: Berger-Levrault et Cie., 1905. Size 10 × 6½, pp. xviii. and 646. *Maps and Illustrations. Price* 15*s.*

Narrative of extensive travels in North and West Africa, including a voyage down the Niger.

Portuguese East Africa.

The Delagoa Directory for 1905. A Year Book of Local Information regarding the Port and Town of Lourenço Marques. Lourenço Marques: A. W. Bayly & Co. Size 8½ × 5½, pp. 132. *Map.*

Sahara. *Renseign. Col., Com. l'Afrique Française* (1905): 37–63. **Laperrine and Nieger.**

Une tournée dans le sud de l'annexe du Tidikelt, du 4 mars au 30 juillet 1904. Rapport du commandant Laperrine, avec un levé d'itinéraire par le lieutenant Nieger. *Map and Illustrations.*

South Africa. **Corstorphine.**

The History of Stratigraphical Investigation in South Africa. By G. S. Corstorphine. (Reprinted from the Report of the South African Association for the Advancement of Science, Johannesburg Meeting, 1904.) Size 9½ × 6½, pp. 145–182. *Presented by the Author.*

South Africa. **Hutchinson.**

From the Cape to the Zambesi. By G. T. Hutchinson. With an Introduction by Colonel F. Rhodes, C.B. London: J. Murray, 1905. Size 8½ × 6, pp. xiv. and 206. *Illustrations. Price* 9*s. net. Presented by the Publisher.*

Interesting as presenting the impressions, in regard to South Africa and its possibilities, of a visitor who has approached the question with unbiassed mind, and is evidently possessed of considerable powers of observation.

South Africa—Barotseland. **Harding.**

In Remotest Barotseland. Being an Account of a Journey of over 8000 miles through the wildest and remotest parts of Lewanika's Empire. By Colonel C. Harding, C.M.G. London: Hurst & Blackett, 1905. Size 9 × 6, pp. xvi. and 414. *Map and Illustrations. Price* 10*s.* 6*d. net. Presented by the Publishers.*

To be reviewed.

Sudan. *La G., B.S.G. Paris* **11** (1905): 1–6. **Lapparent.**

Sur de nouvelles trouvailles géologiques au Soudan. Par A. de Lapparent. *With Illustrations.*

West Africa. *Meteorolog. Z.* **22** (1905): 120–127. **Hann.**

Zum Klima der äquatorialen Westküste Afrikas. Von J. Hann.

West Africa. *Rev. G.* **29** (1905): 52–56. **Olivier.**

La délimitation de la frontière Niger-Tchad. Par E. Olivier. *With Map and Illustrations.*

Zanzibar. **Lyne.**

Zanzibar in Contemporary Times. A Short History of the Southern East in the Nineteenth Century. By R. N. Lyne. London: Hurst & Blackett, 1905. Size 9 × 5½, pp. xii. and 328. *Maps and Illustrations. Price* 10*s.* 6*d. net. Presented by the Publishers.*

See note at p. 212, *ante.*

NORTH AMERICA.

Canada. **Fraser.**

Canada as it is. By J. J. Fraser. London: Cassell & Co., 1905. Size 8 × 5½, pp. viii. and 304. *Illustrations. Price* 6*s. Presented by the Publishers.*

A good popular account of Canadian life, industries, and resources, with forecasts of the future of the Dominion.

Mexico—Historical. **Lamprey.**

Selections from Prescott's History of the Conquest of Mexico. Edited by A. S. Lamprey. London: H. Marshall & Son, 1905. Size 7½ × 5, pp. 148. *Maps and Illustrations. Price* 1*s.* 3*d. Presented by the Publishers.*

North America—Historical. **Biedma and Bourne.**

Narratives of the career of Hernando De Soto in the Conquest of Florida, as told by a Knight of Elvas, and in a Relation by Luys Hernandez de Biedma, Factor of the Expedition. Translated by Buckingham Smith. Together with an account of De Soto's Expedition, based on the Diary of Rodrigo Ranjel, his private secretary. Translated from Obiedo's 'Historia General y Natural de las Indias.' Edited with an Introduction by E. G. Bourne. 2 vols. London: D. Nutt, 1905. Size 7 × 4½, pp. (vol. 1) xxviii. and 224; (vol. 2) 192. *Map and Portrait. Price 7s. 6d. net. Presented by the Publisher.* [To be reviewed.]

North America—Historical. **Dawson.**

The Saint Lawrence Basin and its border-lands, being the Story of their Discovery, Exploration, and Occupation. By S. E. Dawson. London: Lawrence & Bullen, 1905. Size 9 × 6, pp. xl. and 452. *Maps and Illustrations. Price 7s. 6d. Presented by the Publishers.* [To be reviewed.]

North America—Historical. **Lewis and Clarke, and McMaster.**

History of the Expedition under the Command of Captains Lewis and Clark to the Sources of the Missouri, thence across the Rocky Mountains and down the River Columbia to the Pacific Ocean, performed during the years 1804–5–6, by order of the Government of the United States. A complete reprint of the Biddle Edition of 1814, to which all the members of the expedition contributed. With an account of the Louisiana Purchase. By Prof. J. B. McMaster, and notes upon the route. 3 vols. London: D. Nutt, 1905. Size 7½ × 4½, pp. (vol. 1) xxii. and 416; (vol. 2) viii. and 410; (vol. 3) viii. and 382. *Maps and Portraits. Price 10s. 6d. net. Presented by the Publisher.* [To be reviewed.]

United States. *B. American G.S.* **37** (1905): 1–14. **Blanchard.**

The United States Reclamation Service. By C. J. Blanchard. *With Map and Illustration.*

United States. *J. Geology* **12** (1904): 415–469, 617–660. **Peet.**

Glacial and Post-Glacial History of the Hudson and Champlain Valleys. By C. E. Peet. *With Maps and Illustrations.*

United States—California. **Baldwin.**

Rep. U.S. Coast and Geodetic Surv. (1904), Appendix 9: 489–763.

Triangulation in California. Part i. By A. L. Baldwin. *With Maps.*

United States—Floods. **Brandenburg, Alexander, and Sloan.**

Monthly Weather Rev. **32** (1904): 465–468.

September Floods in the South-west. The flood in south-eastern Colorado. F. M. Brandenburg. Recent floods in the Rio Grande Valley. W. H. Alexander. The great floods of September in New Mexico. J. B. Sloan.

United States—Historical. **Hulbert.**

Historic Highways of America. Vols. **13** and **14**, The Great American Canals; vol. **15**, The Future of Road-making in America; vol. **16**, Index. By A. B. Hulbert. Cleveland, Ohio: The Arthur H. Clark Co., 1904–5. Size 8 × 5½, pp. (vol. 13) 232; (vol. 14) 234; (vol. 15) 212; (vol. 16) 188. *Maps and Illustrations.*

The series is now completed, and forms an interesting summary of the history of communications in the United States.

United States—Immigration. *National G. Mag.* **16** (1905): 1–27. **McSweeny.**

The character of our Immigration, Past and Present. By Z. F. McSweeny. *With Diagram.*

Our Immigration in 1904. *With Illustrations and Diagrams.*

United States—Irrigation. *U.S. Census, B.* 16 (1904): pp. 92. **Blanchard.**

Irrigation in the United States: 1902.

United States Levelling. **Hayford.**

Rep. U.S. Coast and Geodetic Surv. (1904), *Appendix* 6: 401–430.

Precise Leveling from Red Desert, Wyoming, to Owyhee, Idaho, 1903. By J. F. Hayford.

United States—Meteorology. *Monthly Weather Rev.* **32** (1904): 556–559. **Kimball.**

Evaporation Observations in the United States. By H. H. Kimball. *Map.*

United States—New Mexico. *Science* **21** (1905): 90–97. **Macbride.**

The Alamogordo Desert. By Prof. T. H. Macbride.

United States—Texas. **Hayford.**

Rep. U.S. Coast and Geodetic Surv. (1904), Appendix 7: 431–450.

Precise Leveling from Holland to New Braunfels, Texas, 1903. By J. F. Hayford.

CENTRAL AND SOUTH AMERICA.

Andes. *G.Z.* **11** (1905): 39–51. **Steffen.**

Neue Forschungen in den Chilenisch-argentinischen Hochkordilleren. Von Dr. H. Steffen. *Map.*

Argentine Republic. **Urien and Colombo.**

Geografía Argentina. Estudio histórico, físico, político, social y económico de la República Argentina. Por C. M. Urien y E. Colombo. Buenos Aires, 1905. Size 11 × 7½, pp. xxxii. and 688. *Maps. Presented by Sr. Carlos M. Urien.* [To be reviewed.]

Jamaica. **Pullen-Burry.**

Ethiopia in Exile. Jamaica revisited. By B. Pullen-Burry. London: T. Fisher Unwin, 1905. Size 8 × 5, pp. 288. *Price* 6*s. Presented by the Publisher.*

Paraguay. **Azara and Schuller.**

Anales del Museo Nacional de Montevideo. Sección histórico-filosófica. Tomo i. Geografía física y esférica de las Provincias del Paraguay, y Misiones Guaraníes. Compuesta por Don F. de Azara. Bibliografía, Prólogo y Anotaciones, por R. R. Schuller. Montevideo, 1904. Size 10 × 7½, pp. cxxxii. and 478. *Facsimile Maps and Plates. Presented by the Museo Nacional, Montevideo.*

Printed for the first time from the manuscript of the well-known naturalist.

AUSTRALASIA AND PACIFIC ISLANDS.

New Caledonia. *Oester. Monats. Orient* **31** (1905): 13–18. **O'Carrol.**

Neu-Kaledonien. Von O. Freiherrn v. Hoennig O'Carrol.

Pacific Ocean. *American J. Sci.* **19** (1905): 143–148. **Agassiz.**

On the Progress of the *Albatross* Expedition to the Eastern Pacific. By A. Agassiz. (See also *Science* **21** (1905): 178–183.)

Queensland. **Petrie.**

Tom Petrie's Reminiscences of Early Queensland. (Dating from 1837.) Recorded by his Daughter. Brisbane: Watson, Ferguson & Co.; London: J. Gray & Son. 1904. Size 8½ × 6, pp. xvi. and 320. *Plan and Illustrations. Presented by Messrs. J. Gray & Son.*

See note at p. 213, *ante*.

South Australia. **Basedow.**

T. and P. and Rep. R.S. South Australia **28** (1904): 12–51.

Anthropological Notes made on the South Australian Government North-West Prospecting Expedition, 1903. By A. Basedow. *With Plates.*

South Australia—Meteorology. **Todd.**

Meteorological Observations made at the Adelaide Observatory, and other places in South Australia and the Northern Territory during the years 1900–1901, under the direction of C. Todd, K.C.M.G., etc. Adelaide, 1904. Size 13½ × 8½, pp. xx., 188, and 168. *Maps. Presented by the Agent-General for South Australia.*

Tobi Island. *Globus* **87** (1904): 113–117. **Seidel.**

Die Bewohner der Tobi-Insel (Deutsch-Westmikronesien). Von H. Seidel.

Victoria. *P.R.S. Victoria* **17** (1905): 366–370. **Hart.**

Note on the Stony Creek Basin, Daylesford. By T. S. Hart. *With Plate.*

POLAR REGIONS.

Arctic—Nansen Expedition. **Nansen and Mohn.**

The Norwegian North Polar Expedition, 1893–96. Scientific Results. Edited by Fridtjof Nansen. Vol. 6. London: Longmans & Co., 1905. Size 12 × 9½, pp. xiv. and 660. *Diagrams. Presented by the Fridtjof Nansen Fund.*

Embraces the meteorological results worked up by Prof. Mohn.

MATHEMATICAL GEOGRAPHY.

Surveying. *C. Rd.* **140** (1905): 302-305. **Driencourt.**

Sur la précision de positions géographiques obtenues en cours de voyage avec l'astrolabe à prisme. Note de M. Driencourt.

Surveying. *C. Rd.* **140** (1905): 413-417. **Laussedat.**

Sur une carte topographique d'une assez grande étendue levée en très peu de temps à l'aide de la Photographie. Note de A. Laussedat.

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Geology. **Geikie.**

Structural and Field Geology for Students of Pure and Applied Science. By James Geikie, LL.D., etc. Edinburgh: Oliver & Boyd, 1905. Size 9 × 6, pp. xx. and 436. *Illustrations. Price* 12*s.* 6*d. net. Presented by the Publishers.*

Geophysics. *Ciel et Terre* **25** (1905): 553-564; **26** (1905): 6-18. **Becker.**

Les problèmes actuels de la Géophysique. Par G. F. Becker.

Geophysics. *C. Rd.* **140** (1905): 899-901. **Leduc.**

Sur la marche de la solidification de la Terre. Note de A. Leduc.

Glaciation. *C. Rd.* **140** (1905): 397-399. **Girardin.**

Sur la relation des phénomènes erratiques avec le modelé des hautes vallées glaciaires. Note de P. Girardin.

Glaciers. *G. Anzeiger* **6** (1905): 1-3, 25-27. **Machaček.**

Zum gegenwärtigen Stande der Gletscherkunde. Von Dr. F. Machaček.

Hydrology—Whirlpools. *Le Globe, Mém. S.G. Genève* **43** (1904): 95-134. **Brunhes.**

Nouvelles observations sur le rôle et l'action des Tourbillons, par J. Brunhes. Avec deux appendices, par S. Squinabol et G. Dal Piaz. *With Plates.*

Limnology—Seiches. *Petermanns M.* **50** (1904): 294-295. **Endrös.**

Seiches kleiner Wasserbecken. Von Dr. A. Endrös.

Meteorology. **Jelinek.**

Jelinek's Anleitung zur Ausführung meteorologischer Beobachtungen nebst einer Sammlung von Hilfstafeln. Fünfte Auflage. Erster Teil. Anleitung zur Ausführung meteorologischer Beobachtungen an Stationen I. bis IV. Ordnung. Wien, 1905. Size 10½ × 7, pp. x. and 127. *Illustrations. Presented by the K.K. Zentral-Anstalt für Meteorologie.*

Meteorology—Halo. **Leyst.**

Die Halophänomene in Russland. Von Prof. Dr. E. Leyst. Moscow, 1903. Size 10½ × 7, pp. 136. *Diagram. Presented by the Observatoire Météorologique, etc., de l'Université Impériale de Moscou.*

Meteorology—Refraction. *Meteorolog. Z.* **22** (1905): 49-63. **Maurer.**

Beobachtungen über die irdische Strahlenbrechung bei typischen Formen der Luftdruckverteilung. Von J. Maurer.

Oceanography. **Bjerrum.**

Meddelelser Kom. Havundersøgelser, Ser. Hydrog. **1** (Nr. 3) (1904): pp. 12.

On the determination of Chlorine in Sea-water, and examination of the accuracy with which Knudsen's pipette measures a volume of Sea-water. By N. Bjerrum.

Oceanography. *P.R.I.* **17** (1905): 357-374. **Buchanan.**

Historical Remarks on some Problems and Methods of Oceanic Research. By J. Y. Buchanan, F.R.S.

Oceanography. **Hansen.**

Meddelelser Kom. Havundersøgelser, Ser. Hydrog. **1** (Nr. 2) (1904): pp. 10.

Experimental determination of the relation between the Freezing-point of Sea-water and its specific gravity at 0° C. By H. J. Hansen.

Oceanography. *Petermanns M.* **51** (1905): 1-4, 25-31. **Nansen.**

Die Ursachen der Meeresströmungen. Von Prof. Dr. F. Nansen.

Physical Geography—Terms. *J. Geology* **12** (1904): 707-715. **Salisbury.**

Three New Physiographic Terms. By R. D. Salisbury. *With Maps and Illustration.*

The terms proposed are "topographic unconformity," "topographic adjustment" (of

streams, in contrast to "structural" adjustment), and "superimposed youth" (such as may result from glacial deposition).

Ripple-mark. *P.R.S.* **74** (1905): 565–566. **Ayrton.**

The Origin and Growth of Ripple-mark. By Mrs. H. Ayrton. (Abstract.)

Sand. *Deutsch. Rundschau G.* **27** (1905): 241–247. **Neuber.**

Der Sand des Strandes und Seine Herkunft. Von A. Neuber.

Springs. *C. Rd.* **140** (1905): 382–384. **Houllier.**

Sur la cause de l'appauvrissement des sources dans les régions de plaines. Note de M. Houllier.

Tides. *Rep. U.S. Coast and Geodetic Surv.*, 1904, Appendix 5 (1904): 313–400. **Harris.**

Manual of Tides. Part iv. B. Co-tidal lines of the World. By R. A. Harris. *With Maps.*

Volcanoes. *La G., B.S.G. Paris* **11** (1905): 7–26. **Boule.**

La Montagne Pelée et les volcans d'Auvergne. Par M. Boule. *With Map and Illustrations.*

Zoogeography—Bird Migrations. *Naturw. Wochenschrift* **4** (1905): 113–120. **Koepert.**

Die Ankunft unserer Zugvögel in ihrer Abhängigkeit von der Phänologie ihrer Nahrungstiere und deren Nahrungspflanzen. Von Dr. Koepert.

Noticed in the Monthly Record (July number, p. 92).

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Anthropogeography. **Mucke.**

Das Problem der Völkerverwandtschaft. Von Dr. J. R. Mucke. Greifswald: J. Abel, 1905. Size 9½ × 6½, pp. xxiv. and 368. *Price 7s. 6d. net.*

This is the third of a series of works by the same author, dealing with the influence of environment on the evolution of primitive societies. Dr. Mucke's ideas are in many ways not calculated to meet with acceptance among ethnologists, but the facts and suggestions here brought together may be of some use to those interested in the subject.

Historical—Pytheas. **Callegari.**

G. V. Callegari. Pitea di Massilea. (Estratto dalla *Rivista di Storia Antica*, Anno vii. 4; vii. 2; ix. 2.) Feltre, 1904. Size 10 × 6½, pp. 88. *Presented by the Author.*

The author shows a wide acquaintance with the literature of the subject, but his conclusions differ in many ways from those of previous writers. They are also frequently at variance with those of Herr Detlefsen (*Journal*, vol. **25**, p. 673), whose memoir had not appeared when the present paper was written.

Language-Study. **Madan.**

An Outline Dictionary intended as an aid in the study of the languages of the Bantu (African) and other uncivilized races. Edited by A. C. Madan. London, etc.: H. Frowde, 1905. Size 7 × 4½, pp. xv. and 400. *Presented by the British South Africa Company.*

English words and phrases suitably arranged, with blank spaces for the filling in of native equivalents, or notes on their method of use. The book should be decidedly useful to travellers among tribes whose languages are little known.

BIOGRAPHY.

Plehn. *Deutsch. Kolonialzeitung* **21** (1904): 373–374. **Ziemann.**

Prof. Dr. Friedrich Plehn. Von H. Ziemann. *Portrait.*

The late Dr. Plehn was well known as a pioneer in West Africa, especially for his services to tropical pathology.

Ratzel. *G. Anzeiger* **5** (1904): 243–247. **Achelis.**

Zum Gedächtnis Friedrich Ratzels. Von Prof. Th. Achelis.

Richter. *M. Deutsch. u. Österrich. Alpenv.* (1905): 29–31. **Penck.**

Eduard Richter. Von A. Penck.

Cf. obituary in the April *Journal* (p. 468).

Schlagintweit. *Deutsche Rundschau G.* **27** (1905): 182–183.

Dr. Emil Schlagintweit. *With Portrait.*

GENERAL.

Bibliography. *G. Teacher* **2** (1904): 264–268. **Herbertson.**

Recent Geographical Works. A list supplementary to that given in Dr. H. R. Mill's 'Hints to Teachers.' By A. J. Herbertson.

Congress. *Ann. G.* **14** (1905): 1–22. **Martonne.**

Le VIII.e Congrès International de Géographie (Washington, 1904) et sa grande excursion dans l'ouest et au Mexique. Par E. de Martonne. *With Illustrations.*

Educational—Regional Geography. *G. Teacher* **2** (1904): 251–254. **Unstead.**

Regional Geography in Schools. By J. F. Unstead.

Urges the need of graduating the teaching of regional geography (in its side which deals with the interrelations of phenomena) according to the attainments of the pupils.

Educational—River Study. *G. Teacher* **2** (1904): 239–244. **Hubbard.**

A River Study. By G. D. Hubbard.

Discusses the study of rivers in general, and their influence on human activities.

Hydrographic Surveys. *National G. Mag.* **16** (1905): 63–67. **Littlehales.**

Marine Hydrographic Surveys of the Coasts of the World. By G. W. Littlehales. *With Maps.*

Miscellanea. **Ratzel.**

Glücksinseln und Träume. Gesammelte Aufsätze aus den Grenzboten. Von F. Ratzel. Leipzig: F. W. Grunow, 1905. Size 9 × 6, pp. vi. and 516. *Portrait. Price 7s.*

A volume of miscellaneous essays dealing largely with personal experiences, and abounding in philosophical reflections on men and things. A less personal item is a study of the German inn.

Phrase-book. **[Murray.]**

Handbook of Travel-talk, being a collection of questions, phrases, and vocabularies in English, French, German, and Italian. Intended to serve as Interpreter to English travellers abroad and Foreigners in England. 19th edition. London: E. Stanford, 1905. Size 5 × 3½, pp. 64 and 688. *Price 3s. 6d. Presented by the Publisher.*

This edition is thoroughly brought up to date by the inclusion of topics which have lately come to the fore.

Science and Metaphysics. **Lobley.**

Positive Knowledge. A Reply to the Cambridge Address of the Right Hon. A. J. Balfour, M.P., &c. By J. Logan Lobley. (Reprinted from the *Journal of the City of London College Science Society*, vol. **10**, Nos. 2 and 3.) Launceston, [*not dated*]. Size 9 × 5½, pp. 22. *Presented by the Author.*

Sciences. *J. Geology* **12** (1904): 669–687. **Davis.**

The relations of the Earth Sciences in view of their progress in the Nineteenth Century. By W. M. Davis.

Travel. **Treves.**

The Other Side of the Lantern. An Account of a Commonplace Tour round the World. By Sir F. Treves, Bart. London: Cassell & Co., 1905. Size 9½ × 6½, pp. xvi. and 424. *Illustrations. Price 12s. net. Presented by the Publishers.*

One of the most striking of recent popular sketches of travel. Although the scenes are not new, the author's power of vivid description and pleasant style of writing lend them a new interest.

Turkish Empire. **Baedeker.**

Konstantinopel und das westliche Kleinasien. Handbuch für Reisende von K. Baedeker. Leipzig: K. Baedeker, 1905. Size 6½ × 4½, pp. xxiv. and 276. *Maps and Plans. Price 6m. Presented by the Editor.*

The first issue of a new guide intended to supplement those previously published on Greece, Egypt, and Syria.

NEW MAPS.

By E. A. REEVES, *Map Curator*, R.G.S

EUROPE.

Ægæan Sea. **Grundy.**

Murray's Handy Classical Maps. Edited by G. B. Grundy, M.A. Mare Ægæum, etc. London: John Murray, [1905]. *Price* 1*s. net. Presented by the Publishers.*

There are the following maps and plans on this sheet: Ægæan sea, Egypt, Propontis, Rome in the time of the Emperors, Rome during the Republic, Roma Quadrata, two small plans showing the areas covered by ancient and modern Rome, Athenæ, Piræeus, and Acropolis. The first three are small general maps, orographically coloured, and the latter nine plans on various scales. As is the case with others of this series, a useful index to place-names is also given.

Austria. **Rothaug and Umlauft.**

Schulwandkarte des Erzherzogtums Osterreich unter der Enns. Bearbeitet von Joh. Georg Rothaug. Für Mittelschulen bearbeitet von Prof. Dr. Friedrich Umlauft. Scale 1:150,000 or 2·4 stat. miles to an inch. Vienna: G. Freytag & Berndt, [1905]. *Price, mounted on linen*, 20*k. Presented by the Publishers.*

This is a wall map of Austria below the Enns, specially designed for the use of schools. The relief is shown first by a system of carefully drawn fine contour-lines, in brown, at intervals of 100 metres, which enable the student by a close examination to gain fairly accurate and detailed information concerning the mountain systems and configuration of the land; whilst superimposed upon these is bold shading which transforms the map into a diagram or wall-map, and brings only the leading features into prominence, so that they can be clearly distinguished from a distance. The shading is of the oblique illumination character, and an attempt has been made to follow the natural colours of the spectrum, the highest crests of the ranges and peaks being orange, the land of medium height yellow, and the lower lands a greenish blue and a blue-green. The general effect is decidedly pleasing and graphic, although the dark shading on the slopes away from the direction in which the light is supposed to fall is perhaps unnecessarily heavy. However, the contour-lines give the form of the land, and will help to prevent the student from being misled.

England and Wales. **Ordnance Survey.**

ORDNANCE SURVEY OF ENGLAND AND WALES:—Sheets published by the Director-General of the Ordnance Survey, Southampton, from June 1 to 30, 1905.

2 miles to 1 inch:—

Printed in colours, folded in cover or flat in sheets, (26 and parts of 27, 33, 34), 44. *Price, on paper*, 1*s.; mounted on linen*, 1*s.* 6*d. each.*

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(Third edition), printed in colours, folded in cover or flat in sheets, 257, 314. *Price, on paper*, 1*s.; mounted on linen*, 1*s.* 6*d. each.*

6-inch—County Maps (first revision):—

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25-inch—County Maps (first revision):—

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15; XCII. 1, 2; XCIII. 1, 2, 3; XCVI. 5, 6, 11; XCVIII. 15; XCIX. 5, 6, 7, 11; CVI. 1. **Suffolk**, VIII. 15; IX. 5, 6, 7, 11. **Warwickshire**, XXIV. 16; XXV. 13, 14, 15; XXVII. 14, 15; XXVIII. 13, 15; XXXI. 4, 8, 12; XXXII. 1, 2, 3, 5, 6, 7, 9, 10, 11; XXXIII. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 16; XXXIV. 2, 3, 4, 6, 7, 8, 10, 11, 12; XXXV. 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12; XXXVII. 13, 14; XLIII. 14. **Yorkshire** (First Revision of 1891 Survey), CCLXXXIII. 13; CCLXXXVIII. 2; CCLXXXIX. 9. 3*s. each.*
(*E. Stanford, London Agent.*)

Europe. **Koch.**

Eisenbahn- und Verkehrs- Atlas von Europa. Von Dr. W. Koch. Leipzig: J. J. Arnd, 1905.

In many respects this atlas resembles the railway atlas of Central Europe by Flemming and Merkel, which was noticed in the last number of the *Geographical Journal*, the principal difference being that, instead of being confined to Central Europe, it includes the whole of the continent, and, in addition, the trans-Siberian railway and a general communication map of the world. The maps vary considerably in the amount of information they contain, and are most irregular and unequal in their arrangement. For instance, there are twenty-six sheets devoted to Germany, four to Switzerland, and seven to France, but only the merest general outline on one sheet to the whole of the British Isles. The atlas is accompanied by tables of statistical information and a good index. A separate handbook to form a companion to the atlas is promised at the end of the year.

France. **Reclus.**

Carte des chemins de fer, routes, et voies navigables de la France, dressée sous la direction d'Onésime Reclus. Scale 1:1,000,000 or 15·8 stat. miles to an inch. Paris: Haar & Steinert, 1905.

A useful railway map of France, with enlarged inset plans of the environs of Paris, Marseilles, and Paris, and a plan of Corsica.

ASIA.

Asia, South-West. **Stanford.**

The Russo-Afghan Frontier. Scale 1:6,589,440 or 104 stat. miles to an inch. London: Edward Stanford, 1905. *Price* 2*s.* 6*d.*

A small general map of Central Asia extending from the Aral sea and Lake Balkash on the north to Peshawur on the south, and from the Caspian on the west to western Tibet on the east. The special feature of the map is that it shows garrison towns and fortified posts, which are distinguished from each other by different symbols, as well as railways proposed and constructed in red.

Asia, South-West. **Topographical Section, Caucasian Military Staff.**

Map of Caucasia, Asiatic Turkey, and Persia. Scale 1,680,000 or 26·5 stat. miles to an inch. 10 sheets. [In Russian.] Tiflis: Topographical Section, Caucasian Military Staff, 1903.

This is a general Russian map of Western Asia, extending from Asia Minor to the western frontier of Afghanistan, and from north of the Caspian to the Red sea and the coast of Baluchistan. It is printed in colours, and contains a considerable amount of detail and many place-names. The latter, however, are in certain districts somewhat confused through being printed upon the dark hill-shading.

China. **China Inland Mission.**

Map of China prepared for the China Inland Mission. Scale 1:3,168,000 or 50 stat. miles to an inch. 4 sheets. New edition. London: Edward Stanford, 1905. *Price* 8*s.*

Although specially prepared to show the stations of the China Inland Mission, which are underlined in red, and those of other Protestant missions, underlined in blue, this map has been found to be of considerable service for purposes of general reference, and this new edition will doubtless be welcomed. Some of the more important routes of explorers are shown, as well as railways working and proposed. The information given is, of course, of a very general character.

Indian Government Surveys. **Surveyor-General of India.**

Indian Atlas, 4 miles to an inch. Sheets: 10 S.E., part of district Thar and Parkar (Sind, Bombay Presidency), additions to 1904. 13 N.E., parts of Baroda State and Kathiawar Agency (Bombay Presidency), additions to 1897, 1903. 13 S.E., parts of Baroda State and Kathiawar Agency (Bombay Presidency), additions to

1900, 1903. 22 N.W., parts of district Ahmedabad and Native States Baroda, Cutch, Kathiawar and Palanpur Agencies (Bombay Presidency), additions to 1898, 1903. 28 S.W., parts of districts Hazara (N.W.F. Province), Rawalpindi (Punjab), and of Kashmir State, additions to 1904. 28 S.E., part of Kashmir State (Punjab), additions to 1904. 31 N.E., parts of districts Ferozepore and Ludhiana and of Native States Patiala, Nabha, Faridkot, and Jind (Punjab), additions to 1902. 31 S.W., parts of district Ferozepore and Native States of Bahawalpur (Punjab) and Bikaner (Rajputana Agency), corrected to 1902. 32 N.W., parts of Bikaner Native State (Rajputana Agency), additions to 1902, 1904. 32 N.E., parts of district Hissar and Native States Loharu (Punjab) and Bikaner (Rajputana Agency), additions to 1904. 37 S.E., part of district Khandesh (Bombay Presidency), and of Native State Indore (C.I. Agency), additions to 1901, 1904. 38 S.W., parts of districts Nasik, Ahmednagar, Poona, and Thana (Bombay Presidency), and Aurangabad (Nizam's Dominions), corrections to 1902. 38 S.E., parts of districts Aurangabad and Bir (Nizam's Dominions), Ahmednagar, and Nasik (Bombay Presidency), additions to 1904. 41 S.E., parts of districts Dharwar, Belgaum, and Kanara, Kolhapur, and Southern Maratha and Dharwar Agencies (Bombay Presidency), and district Lingsugur (Nizam's Dominions), 1904. 47, parts of districts Ludhiana, Jullundur, Hoshiarpur, Kangra, Simla, and the Protected Hill States of Mandi, Bashahr, etc. (Punjab), and of district Dehra Dun and the Native State of Garhwal (United Provinces), additions to 1903. 48 N.W., parts of districts Umballa, Ludhiana, and Karnal, and of Patiala, Nabha, Jind, Maler Kotla, and Kalsia Native States (Punjab), additions to 1903. 48 S.E., parts of districts Dehra Dun, British Garhwal, Saharanpur, Muzaffarnagar, and Bijnor (United Provinces), Karnal and Umballa (Punjab), additions to 1902. 49 N.E., parts of districts Moradabad, Meerut, Muzaffarnagar, Bulandshahr, and Bijnor (U.P. of Agra and Oudh), Delhi, and Karnal (Punjab), additions to 1903. 50 S.W., parts of Bharatpur, Alwar, Karauli, and Jaipur States (Rajputana Agency), 1904. 61, parts of districts Malabar, Coimbatore, Madura, and Salem (Madras Presidency), and of district Mysore (Mysore Native State), and Coorg, addition to 1903. 66 N.W., parts of districts Garhwal and Dehra Dun and Tehri Garhwal State (United Provinces), additions to 1902. 66 N.E., parts of districts Almora and Garhwal (United Provinces), and Hundes (Tibet), and of Nepal, additions to 1900. 66 S.W., parts of districts Bijnor, Almora, Naini Tal, and Garhwal, and Tehri Garhwal State (United Provinces), additions to 1903. 66 S.E., parts of districts Naini Tal, Almora, and Garhwal (United Provinces), and of Nepal, additions to 1903. 67 N.W., parts of districts Moradabad, Bijnor, Bareilly, Naini Tal, and Rampur State (United Provinces), additions to 1901. 70 S.W., parts of districts Sangor and Damoh (Central Provinces), Jhansi (United Provinces), and of Native States Gwalior, Bhopal, and Panna (C.I. Agency), additions to 1903. 72 N.W., parts of districts Chindwara, Betul, Nagpur, Seoni, and Amraoti (Central Provinces), additions to 1902. 72 S.W., parts of districts Nagpur, Wardha, and Amraoti of Berar (Central Provinces), additions to 1904. 72 S.E., parts of districts Nagpur, Bhandara, Raipur, Balaghat, and Chanda (Central Provinces), additions to 1903. 78 S.E., parts of districts Chingleput, North Arcot, and South Arcot (Madras Presidency), 1904. 79 S.E., parts of districts Tanjore, Trichinopoly, and South Arcot (Madras Presidency), Karikal (French Territory), additions to 1900, 1904. 105 N.E., parts of districts Palamau, Rauchi, and Singhbhum, and of Jashpur State (Bengal), additions to 1904. 105 S.E., parts of districts Ranchi, Singhbhum, States Bonai, Gangpur, Jashpur, Keonjhar (Bengal), district Sambalpur, and State Bamra (Central Provinces), additions to 1903. 115, parts of districts Balasore, Cuttack, and Midnapore, and of Mayurbhanja, Keonjhar, Dhenkanal, Hindol, Bonai, Lahara, Tigiria, Athgar, Nilgiri, and Baramba Tributary States of Orissa (Bengal), additions to 1902. 116, parts of districts Cuttack, Puri, and Tributary States of Baramba, Nayagar, Ranpur, Tigiria, etc. (Bengal), additions to 1903. 119, district Bogra, and parts of districts Purnea, Dinajpur, Rangpur, Malda, Murshidabad, Rajshahi, and Mymensingh (Bengal), Goalpara and Garo Hills (Assam), additions to 1902. 121, district Howrah, and parts of districts 24 Parganas, Burdwan, Khulna, Nadia, Jessore, Faridpur, Backergunge, Midnapore, and Hooghly (Bengal), additions to 1903. 130 N.W., parts of districts Darrang, Sibsagar, Nowgong, Lakhimpur, Naga Hills (Assam), and Daphla Hills, additions to 1903. 130 S.W., parts of districts Nowgong, Cachar, Naga Hills, and Sibsagar, and Manipur State (Assam), additions to 1904.—Military map of India, 32 miles to an inch, corrected to 1903, 1904.—Western Bengal Survey, 8 miles to an inch. Sheets: 2, districts Shahabad, Saran, Gaya, Palamau, etc, additions to 1903. 7, districts Patna, Muzaffarpur, Darbhanga, Purnea, Bhagalpur, Monghyr, etc., and part of Nepal State, additions to 1903.—Province

of Bengal, 16 miles to an inch; Third Edition, 1904.—Bengal District maps, 4 miles to an inch: Belasore, 1904; Muzaffarpur, 1904. 8 miles to an inch: Backergunge, 1903; Jessore, 1903; Rangpur, 1902; Monghyr, corrected to 1903, 1904.—Bengal Lower Provinces district maps, 4 miles to an inch: Hazaribagh, 1904; Nadia (Presidency Division), additions to 1904; Rangpur, additions to 1902, 1904.—Bombay District maps, 4 miles to an inch: Nasik, 1904; Satara, 1904.—Central Provinces District maps, 4 miles to an inch: Bhandara, 1904; Chanda, 1904; Chindwara, 1904; Narsinghpur, 1904; Sambalpur, 2 sheets, 1904; Saugor, 1904; Seoni, 1904.—Punjab District map, 4 miles to an inch: Shahpur, 1904.—United Provinces district maps, 4 miles to an inch: Kheri, 1904: Shahjahanpur, 1904. 8 miles to an inch: Banda, corrected to 1903; Hamirpur, corrected to 1903; Jhansi, corrected to 1902.—Assam District map, 4 miles to an inch: Nowgong, 1904.—North-Eastern Frontier Survey, 4 miles to an inch. Sheet: (Second Edition) 31 N.W., part of Yun-nan Province (China), Season 1899-1900, 1904.—South-Eastern Frontier Survey, 4 miles to an inch. Sheets: (Fourth Edition) 1 N.W., parts of districts Lushai Hills and Native States of Manipur (Assam), Hill Tippera and Chittagong Hill Tracts (Bengal), Chin Hills (Burma), Seasons 1853-66, 1871-72, 1888-94, additions to 1904, 1904; (Fifth Edition) 2 S.E., parts of districts Pakokku, Minbu, Myingian, Meiktila, Yamethin, Magwe, and Chin Hills, Seasons 1885-87, 89-91, and 1897, additions to 1902, 1904; (Fourth Edition) 3 N.E., portions of Minbu, Magwe, Yamethin, Thayetmyo, Prome, and Toungoo Districts, Seasons 1885-87, 1890-92, 1903; 12 S.W., S.E., China, Yun-nan Province, Season 1894-95, 1898-1900, 1902.—North-Western Trans-Frontier Survey, 8 miles to an inch. Sheets: (Second Edition) 22, parts of Afghanistan, Baluchistan, and Sind, 1903. 4 miles to an inch. Sheets (Fourth Edition) 29 S.W., part of Baluchistan and Punjab, Seasons 1883-88, 1894-97, 1904. 2 miles to an inch. Sheets: 423, part of Afghanistan, Season 1879-89, 1904; 424, parts of Afghanistan and the N.W.F. Province, Seasons 1879-80, 1894-95, 1904.—Assam Survey, 1 mile to an inch. Sheets: (Preliminary Edition) 17, districts Kamrup and Goalpara, Seasons 1893-95, 1896-97, 1904; (Preliminary Edition) 25, district Kamrup, Seasons 1883-86, 1896-97, 1904; (Preliminary Edition) 98, district Lakhimpur, Season 1891-92, 1899-1900, 1904; (Preliminary Edition) 99, districts Sibsagar and Lakhimpur, Seasons 1891-92, 1898-99, 1904.—Lower Provinces Revenue Survey, 1 mile to an inch. Sheet 14, district Purneah, 1901.—Bengal Survey, 1 mile to an inch. Sheets: 112, 114, districts Muzaffarpur and Saran, Seasons 1892-95, 1896-99, 1904; 141, districts Muzaffarpur and Darbhanga, Seasons 1894-96, 1899-1900, 1904; 168, district Puri, Seasons 1889-91, 1895-96, 1904; (Second Edition) 194, district Cuttack, Season 1890-92, 1894-95, 1904; (Preliminary Edition) 198, district Darbhanga, Seasons 1895-96, 1899-1900, 1904; (Second Edition) 286, district Hooghly, Howrah, Burdwan, 24 Parganas, and Nadia, Seasons 1849-57, 1869-72, 1903; (Second edition) 287, districts Howrah, Hooghly, and 24 Parganas, Seasons 1851-55, 1869-72, 1903; 315, district Jalpaiguri, Seasons 1890-91, 1892, 1903; 409, 420, district Chittagong, Seasons 1888-93, 1904.—Bombay Survey, 1 mile to an inch. Sheets: (Second Edition) 96, parts of districts Ahmedabad, Baroda State, and Kathiawar Agency, Seasons 1866-67, 1867-68, 1902; 196, districts Poona and Thana, Seasons 1877-78, 1879-80, 1902; 200, districts Poona, Satara, and Kolaba, and Poona Agency, Season 1875-76, 1901; 243, district Belgaum and Kolhapur, Savantvadi, Sangli and Kurundvad States, Season 1886-87, 1901; 279, district N. Kanara, Seasons 1890-92, 1896-97, 1903.—Burma, and Bengal Surveys, 1 mile to an inch. Sheets: 4 (Burma), 428 (Bengal), parts of districts Akyab (Burma) and Chittagong (Bengal), Seasons 1884-87, 1891-93, 1904.—Burma Survey, 1 mile to an inch. Sheets: (Preliminary Edition), 103, 104, 105, district Lower Chindwin, Seasons 1899-1902, 1904; 119 (N.S.) parts of districts Henzada, Prome, and Sandoway, Seasons 1898-1901, 1904; (Preliminary Edition) 146 (N.S.) district Shwebo, Seasons 1892-97, 1901; (Second Edition) 162 (N.S.) parts of districts Prome and Henzada, Seasons 1882-83, 1885-89, 1898-90, 1903; 200, parts of districts Myingyan, Magwe, Yamethin, and Meiktila, Seasons 1893-94, 1901-02, 1903; 202 (N.S.) parts of districts Yamethin and Magwe, Seasons 1893-95, 1897-1900, 1901-02, 1904; (Second Edition) 241 (N.S.) parts of districts Mandalay, Shwebo, and Hsipaw (N. Shan States), Seasons 1890-93, 1897-98, 1899-1900, 1901-02, 1903; (Second Provisional Edition) 295 (N.S.) parts of district Yamethin and Southern Shan States, Seasons 1894-95, 1899-1900, 1903; (Preliminary Edition) 304 (N.S.) districts Pegu and Toungoo, Seasons 1896-98, 1904; 444 (N.S.) parts of Southern Shan States, Season 1902-03, 1904.—Central Provinces Survey, 1 mile to an inch. Sheets: 262, 263, district Sambalpur, Season 1884-87, 1903.—Central India and Rajputana Survey, 1 mile to an inch. Sheets: 203, parts of States Indore, Gwalior

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Indo-China. **Service Géographique de l'Indo-Chine.**

Carte de l'Indo-Chine. Scale 1 : 1,000,000 or 15·8 stat. miles to an inch. 9 sheets. Paris: Service Géographique de l'Indo-Chine, 1903.

This map has been chiefly compiled from the surveys and route-maps of French officers serving in Indo-China. The northern part, including Yunnan and Burma, requires thoroughly revising and bringing up to date from the recent surveys of Majors Ryder and Davis, and others. The map includes the whole of Tongkin, Siam, Annam, and the neighbouring regions of Burma and China. It is clearly drawn and printed in colours.

Java. **Topographical Bureau, Batavia.**

Overzichtskaart van Java en Madoera. Scale 1 : 500,000 or 7·9 stat. miles to an inch. 8 sheets. Batavia: Topographisch Bureau, 1905.

A well-executed map of Java, printed in colours at the Topographical Bureau at Batavia, from which department many other most excellent maps of the Netherlands East Indies have been issued. It is doubtless the best general map of the island at the present time, and is on a sufficiently large scale to be really useful.

Manchuria. **Topographical Section, General Staff.**

Map of Country west of Ninguta. Scale 1 : 420,000 or 6·6 stat. miles to an inch. May, 1905. London: Topographical Section, General Staff, War Office. *Price* 2*s.* *Presented by the Director of Military Operations.*

Vladivostok. **Topographical Section, General Staff.**

Map of Country round Vladivostok. Scale 1 : 420,000 or 6·6 stat. miles to an inch. June, 1905. London: Topographical Section, General Staff, War Office. *Price* 2*s*. *Presented by the Director of Military Operations.*

Yunnan. **Service Géographique de l'Indo-Chine.**

Itineraire de A Mi Tchéou a Yunnan-Sen. Scale 1 : 100,000 or 1·6 stat. mile to an inch. 1903. Itineraire de Lao Kay a Mong Tze par la vallée du Sin Chienn Ho. Scale 1 : 50,000 or 1·3 inch to 1 stat. mile. 3 sheets. 1900.—De Lao Kay a Mong Tze. Scale 1 : 200,000 or 3·1 stat. miles to an inch. Service Géographique de l'Indo-Chine.

These are facsimiles of original route-maps and sketches, showing merely the routes followed and the country immediately adjacent.

AFRICA.

Africa. **Stanford.**

Stanford's Orographical Map of Africa. Compiled under the direction of H. J. Mackinder, M.A. Scale 1 : 7,286,400 or 115 stat. miles to an inch. 4 sheets. London: Edward Stanford, 1905. *Price* 16*s*. *Presented by the Publisher.*

Stanford's series of new orographical maps, to which this belongs, promises to be most useful for educational purposes. The Europe appeared some time ago, and now the Africa has just been issued, while others are in course of preparation. They are being compiled under the supervision of Mr. H. J. Mackinder, which is in itself sufficient to guarantee that no pains will be spared to ensure general accuracy and the most satisfactory results as regards the representation of the relief. With reference to the latter, there is much to commend, especially the adoption of shades of one colour—brown—only instead of different colours for land above sea-level. There are altogether six of these tints, ranging from sea-level to over 15,000 feet, and the intervals have been carefully selected to bring out clearly the leading orographical features of the continent. The mountain ranges are also indicated by vertical hachures, but these are so faint that they do not interfere with the tinting, as is often the case when there is an attempt made to combine the two systems. Depths of the surrounding oceans are indicated by tints of blue. The names have been carefully selected, and altogether the four sheets, when mounted, will form an excellent wall-map for schools.

Africa. **Topographical Section, General Staff.**

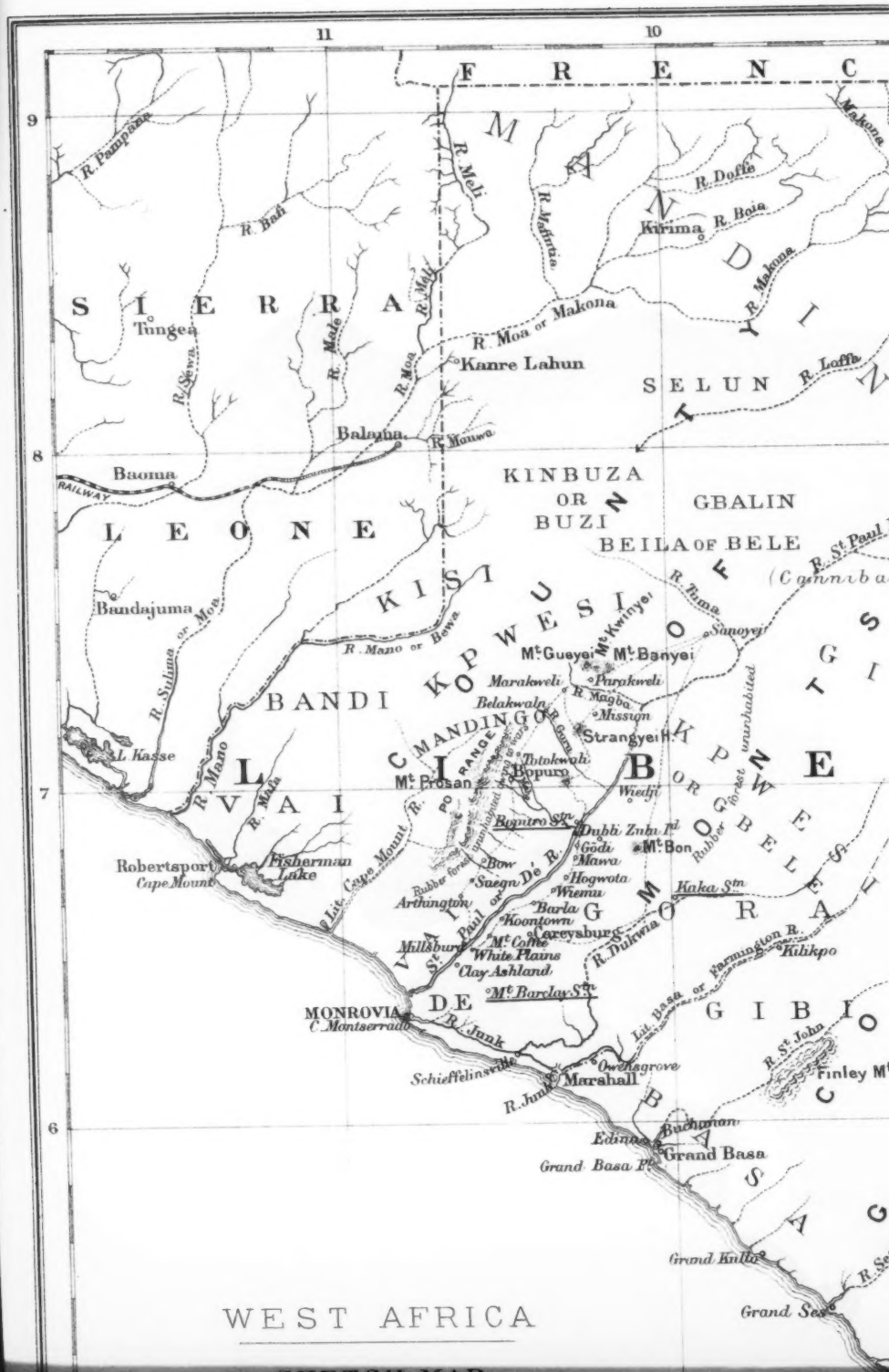
Map of Africa. Compiled in the Topographical Section, General Staff. Scale 1 : 250,000 or 3·9 stat. miles to an inch. Northern Nigeria (Provisional). Sheets: 50-H, K, L, O, P; 51-J, M. London: T.S., G.S., War Office, 1905. *Price* 1*s*. 6*d*. *each sheet. Presented by the Director of Military Operations.*

Gold Coast Colony. **Watherston.**

Plan of Tarkwa District, showing concessions surveyed by the Gold Coast Government Mines Survey, West Africa, under the direction of Major A. E. Watherston, C.M.G., R.E. Scale 1 : 50,000 or 1·3 inch to a stat. mile. 3 Sheets. London: Edward Stanford, 1904. *Presented by His Excellency the Governor of the Gold Coast Colony.*

An outline map without hills. The concessions surveyed are all clearly indicated, and their areas and lengths of sides given in figures upon each of them. Roads surveyed by theodolite are distinguished from those laid down from compass traverses. The map is a good example of the excellent survey work done in the Gold Coast under the superintendence of Major A. E. Watherston.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.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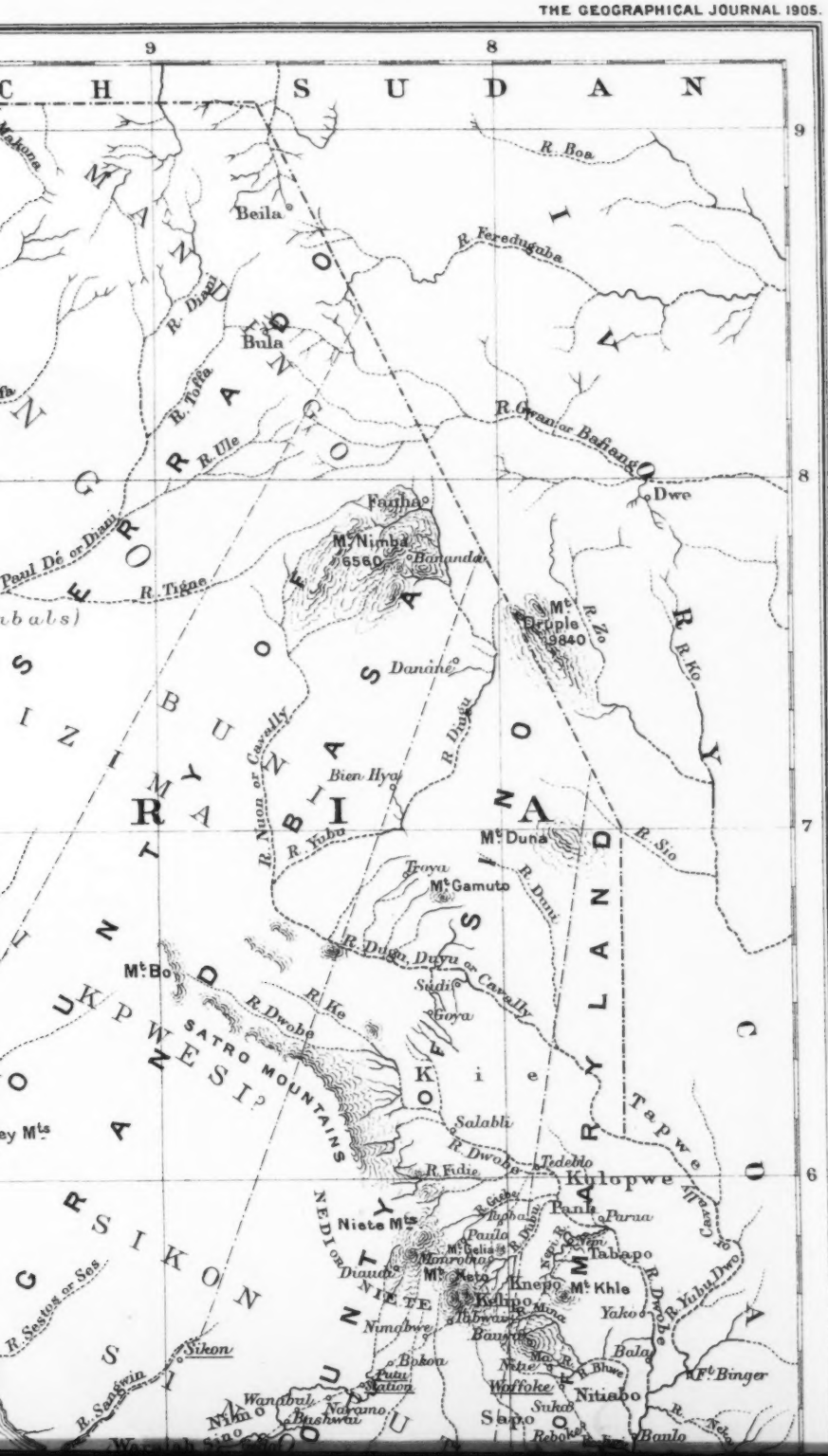
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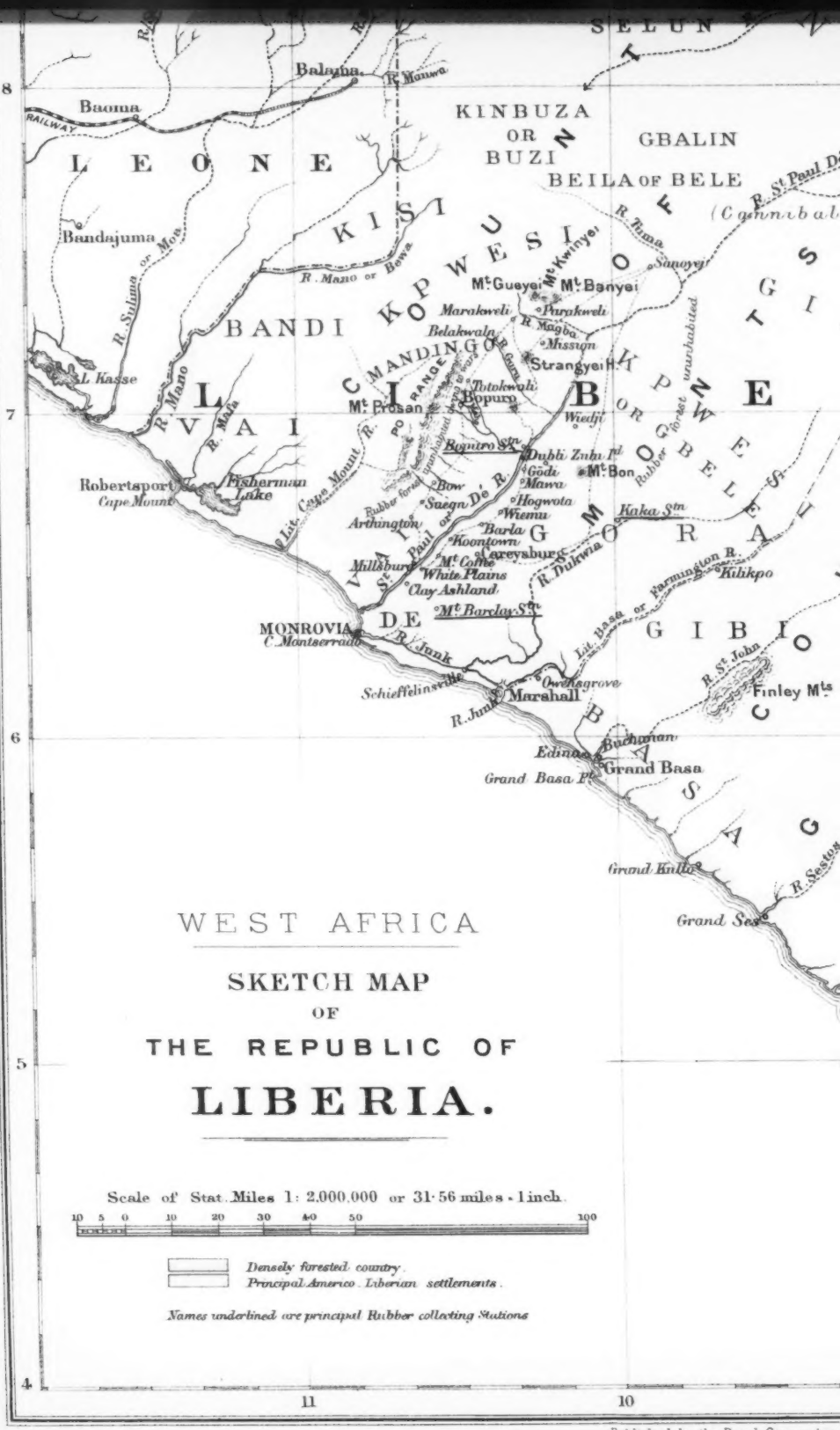

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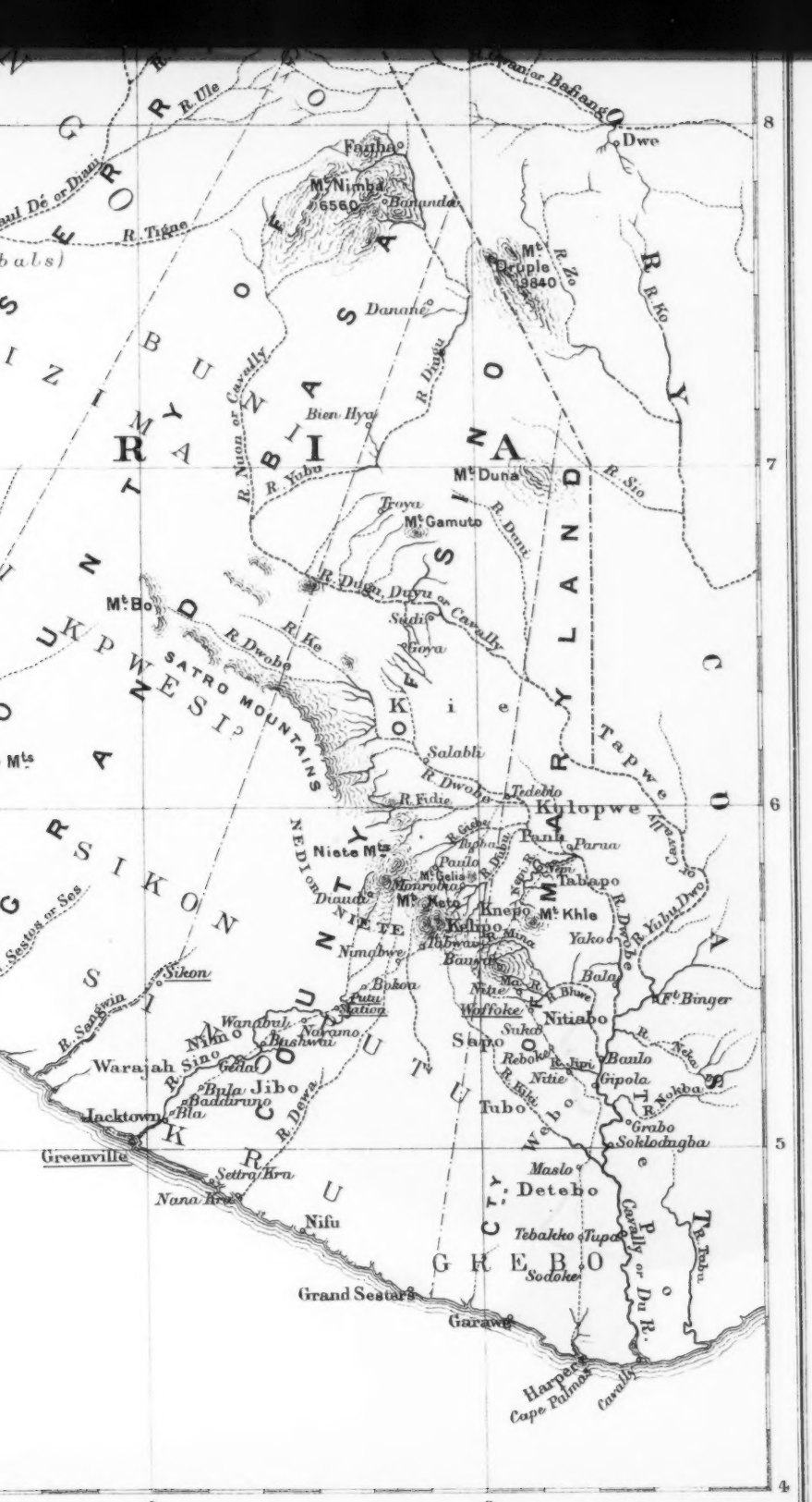
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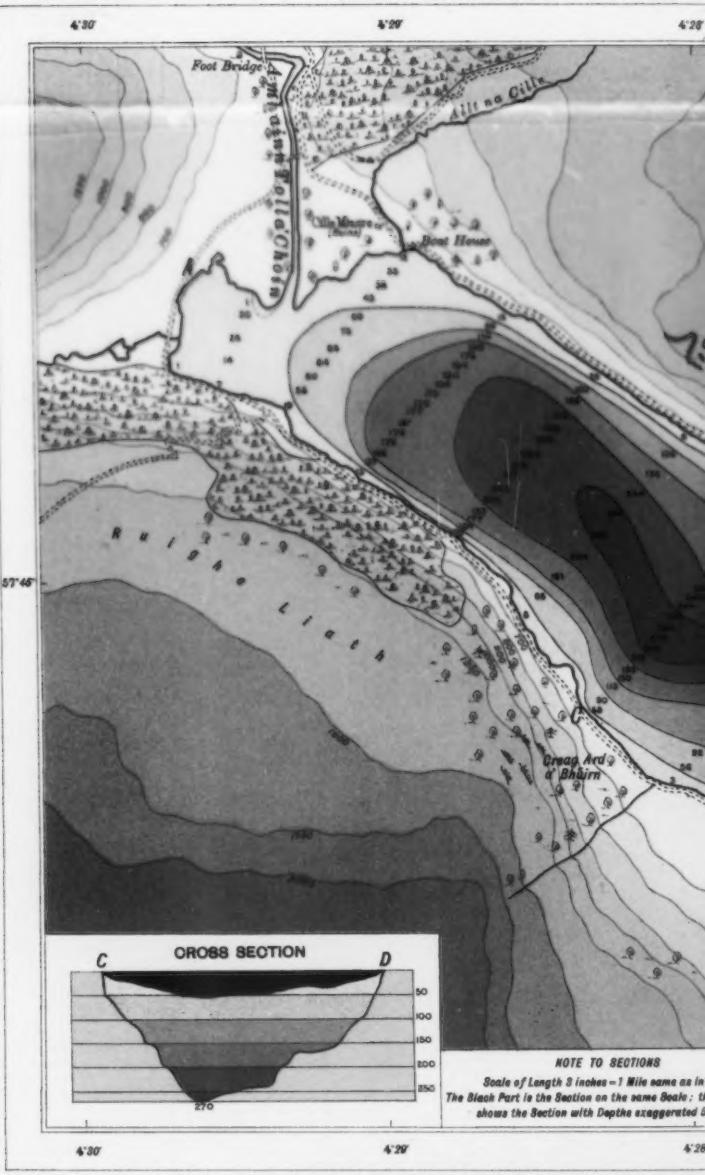
PLATE VII

SIR JOHN MURRAY, K.C.B., F.R.S., D.Sc., AN



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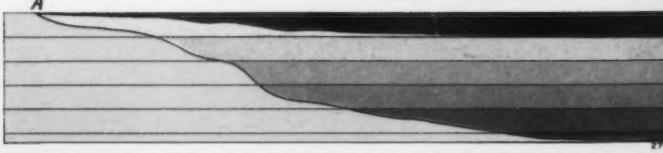

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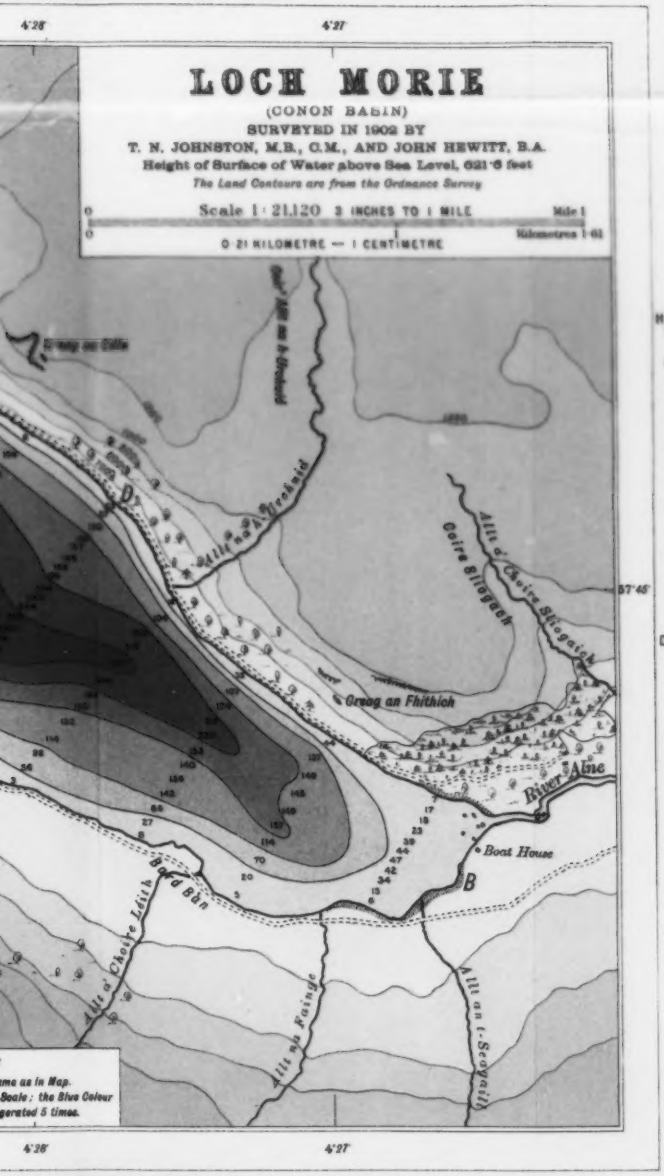

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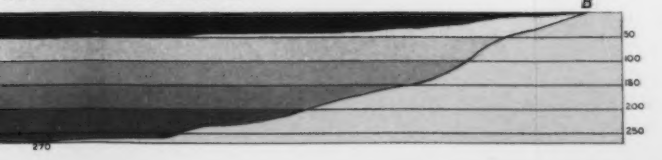

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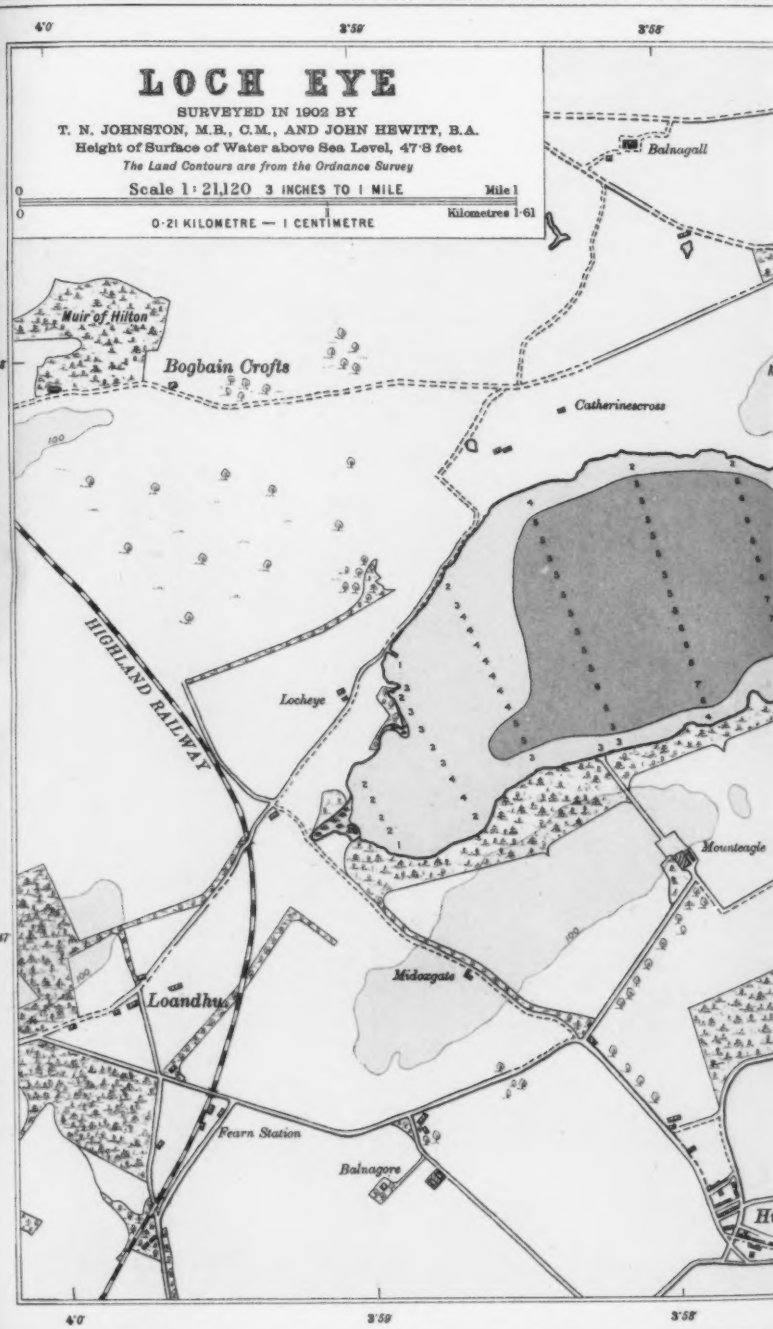

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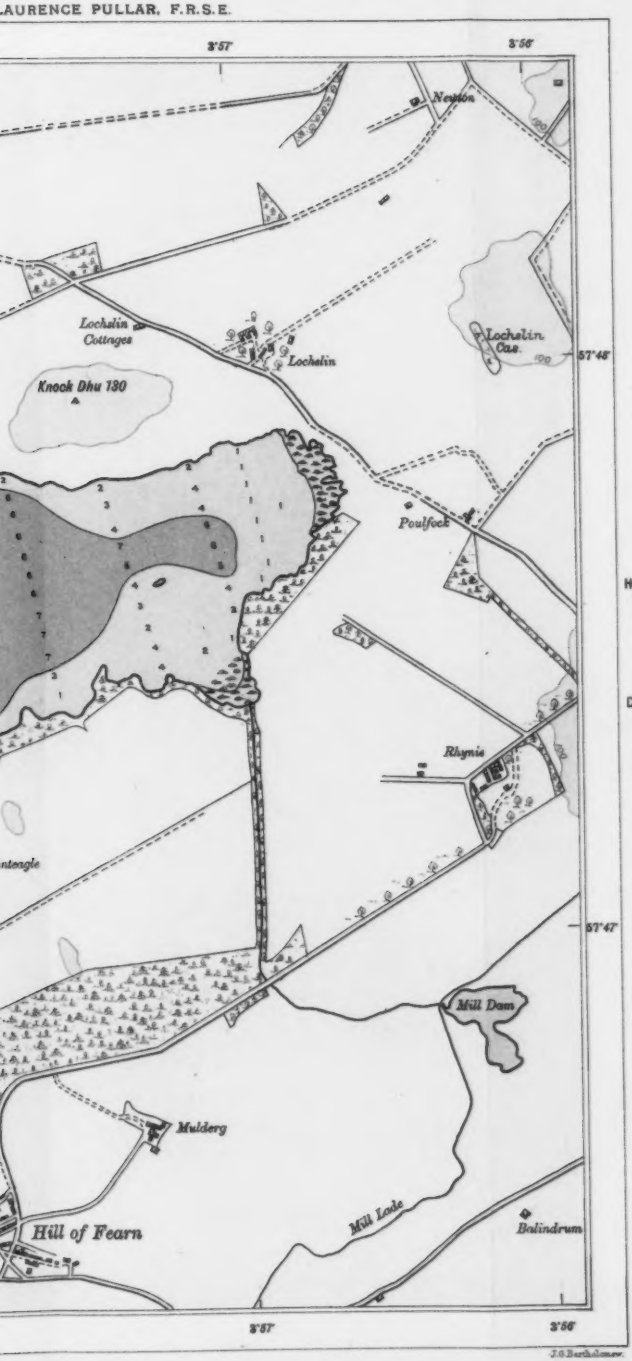
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